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- Validity and reliability of the Patient Activation Measure® (PAM®)-13 Malay version among patients with Metabolic Syndrome in primary care
- Patient perception of pre-pregnancy care and family planning among reproductive-age female diabetes mellitus patients in a primary care clinic in Penang, Malaysia
- Factors Influencing Malaysian Men's Perceptions of Gender Equity in Family Planning



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- Books and other monographs: Personal Author(s) Stewart M, Brown JB, Weston WW, et al. Patient-Centered Medicine: Transforming the Clinical Method. Thousand Oaks, California: Sage Publications; 1995.
- Books and other monographs: Corporate Author WONCA International Classification Committee. International Classification of Primary Care, ICPC-2. 2nd ed. Oxford: Oxford University Press; 1998.

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Reviewer List

We need a research plan

Chirk Jenn Ng

Advisor of MFP

As I browse through the articles published in this issue of MFP, a thought crosses my mind: All research articles in this issue are *exploratory* in nature with article types ranging from literature review, cross-sectional studies to case reports. None focuses on *developing* or *evaluating* health interventions, which are more likely to have an impact on clinical practice.

So, are these 'baseline' studies worth publishing in MFP?

While evidence from these exploratory studies often does not directly change practice, it is the critical first step in the research pipeline that leads to effective interventions. Without understanding what is happening on the ground, and what have or have not been done, we cannot begin to develop effective solutions to tackle healthcare problems.

I would argue that primary care research must be conducted with patients in mind; hence the purpose of conducting exploratory studies is to develop effective interventions to improve patient care. Moving on from developing an intervention, it should be evaluated rigorously and, if found to be effective, implemented in the real-world primary care setting. This 'research journey' mimics that of the UKMRC Complex Intervention Framework,¹ which I have adapted using domiciliary care as an exemplar (**Figure 1**).

A Research Framework

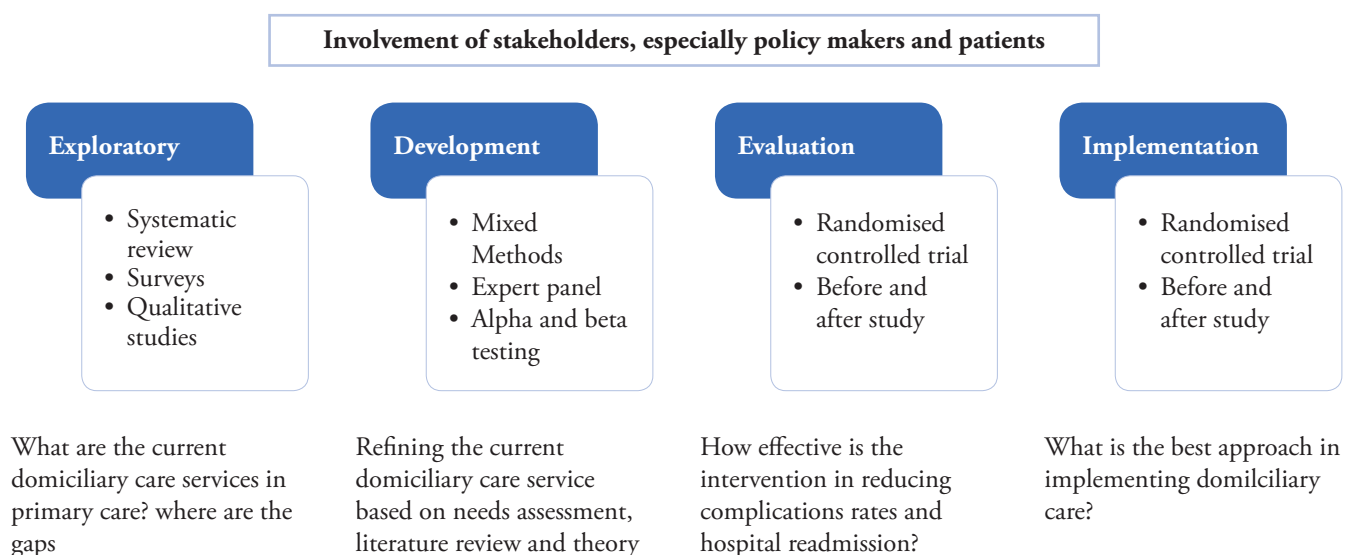


Figure 1: A proposed primary care research framework

The initial exploratory phase is to find out the current practices, gaps and needs. Based on the exploratory findings, literature review and theoretical framework, a tailored health intervention can be developed to improve patient care. Developing an intervention must be tested with patients and healthcare providers who will be using the service in the future. Once the intervention is developed, it should be evaluated rigorously using appropriate research methods and outcome measures, which are practical and relevant to primary care. For instance, cluster randomised controlled trial are more feasible, and patient reported outcome measures, such as PAM,² are more appropriate outcome measure. Finally, evidence-based interventions should be implemented; but how this can be implemented successfully requires sound Implementation Science research.³

I would urge all authors who have published in this issue of MFP to move your research journey to the next level (if you have not already done so). This takes time but will go a long way in shaping research agenda in primary care and providing evidence-based care for our patients.

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Barriers to Making House Calls by Primary Care Physicians and Solutions: A Literature Review

Seah JY

Seah Jing Yan. Barriers to Making House Calls by Primary Care Physicians and Solutions: A Literature Review. *Malays Fam Physician*. 2020;15(3);3–9.

Keywords:

house call; home visit; barriers; solutions; general practitioner; family physician

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Abstract

Background: The number of house calls made by physicians has been declining over the years, while the number of people requiring house calls, especially the elderly, is growing.

Aim: To consolidate the literature regarding the barriers faced by primary care physicians in making house calls.

Design of the study: Literature review.

Method: Studies were sourced from PubMed and Embase.

Results: 7 studies were selected to be in the literature review. Barriers to making house calls by primary care physicians include inadequate remuneration, lack of time and training, unconducive home environment, concerns with professional liability and safety, and perceived low value-added in the patient's quality of care.

Conclusion: While primary care physicians do recognize the value of house calls in patient care, the perceived limited standard of care that can be achieved in the home setting, busy clinic practice (large patient loads), coupled with inadequate remuneration make house calls unrealistic for many doctors. These barriers must be addressed to ensure accessibility to primary health care services for the immobile, frail, and sick is not being compromised. One of the solutions may be to expose medical students and residents to house calls early through mentorship.

Introduction

House calls, defined as physicians visiting patients at their homes with the aim of assessing, treating, and giving a follow up,¹ used to be an intrinsic part of physician practice¹ and a tradition of family medicine. A recent study² conducted in Switzerland by Mueller et al. (2019) revealed that the number of house calls provided by physicians has been dropping. The study showed that the mean annual number of visits per physician decreased from 125 in 2006 to 75 in 2015, leading to a 40% decline in the absolute number of visits. Although no official statistics are available, it is probably reasonable to assume that a similar situation prevails in Singapore³ and Malaysia. Part of this phenomenon may be accounted for by advances in hospital- and clinic-based care,^{1,4} information technology such as the use of telemedicine, improved transportation, better communication,⁴ and an increase in the geographic dispersion of medical practice.⁴

In light of an aging population in several developed countries such as Singapore,³ the increase in the number of frail, elderly patients with several medical conditions and impaired ability to travel to clinics will

likely mean that more medical care will have to be provided in their homes.³ Physicians going to patients' homes will spare these patients from the physical discomfort^{5,6} and psychological distress of travel,⁶ which can be expensive as well.⁵ House calls are a valuable component of patient care as they allow physicians to better identify and assess the patient's social circumstances and living environment,^{1,7} as well as detecting more problems than an office visit would.^{7,8} These advantages may allow for a more effective and a holistic treatment plan.^{1,7} House calls were also found to reduce hospital stays, delay institutionalization, and improve the physician-patient relationship.⁷

Despite the recognition of the value of house calls in patient care among physicians,^{3,6,9} there has been a decline in the number of house calls. This review, therefore, aims to consolidate the literature regarding the barriers to making house calls from the perspectives of primary care physicians.

Methods

Search strategy

Databases PubMed and Embase were used

to find relevant studies. Search terms used for PubMed were (house call[medical subject headings (MeSH) Terms] OR home visit[MeSH Terms] OR home care services[MeSH Terms]) AND (general practitioner[MeSH Terms] OR family physician[MeSH Terms] OR primary care physician[MeSH Terms]) AND (physician practice patterns[MeSH Terms] OR attitude of health personnel[MeSH Terms]). Search terms used for Embase were (house call OR home visit OR home care services) AND (general practitioner OR family physician OR primary care physician) AND (practice patterns OR attitude OR factors). The year of publication was initially restricted from January 2010 to January 2020, so that studies included in this review are relevant to the current situation of practice. However, due to a paucity of articles, the year of publication was then lengthened from January 2000 to January 2020. The language of publication was restricted to English. Results from the searches were manually reviewed by title and abstract, if available, to select possible studies for inclusion. When appropriate, full-text papers were reviewed. The resulting list was

then examined in more detail. Additional relevant articles were also hand-searched based on the references in the shortlisted articles. Additional articles were also hand-searched on Google Scholar.

Selection process

Inclusion criteria

Articles discussing reasons for the decline in the number of house calls made by primary care physicians from the primary care physicians' perspectives were shortlisted for review.

Exclusion criteria

Studies were excluded if they met one or more of the following criteria: (a) discusses house calls made by specialists as this paper focuses on the perspectives of primary care physicians; (b) type of article is an editorial or a commentary; (c) only an abstract was available.

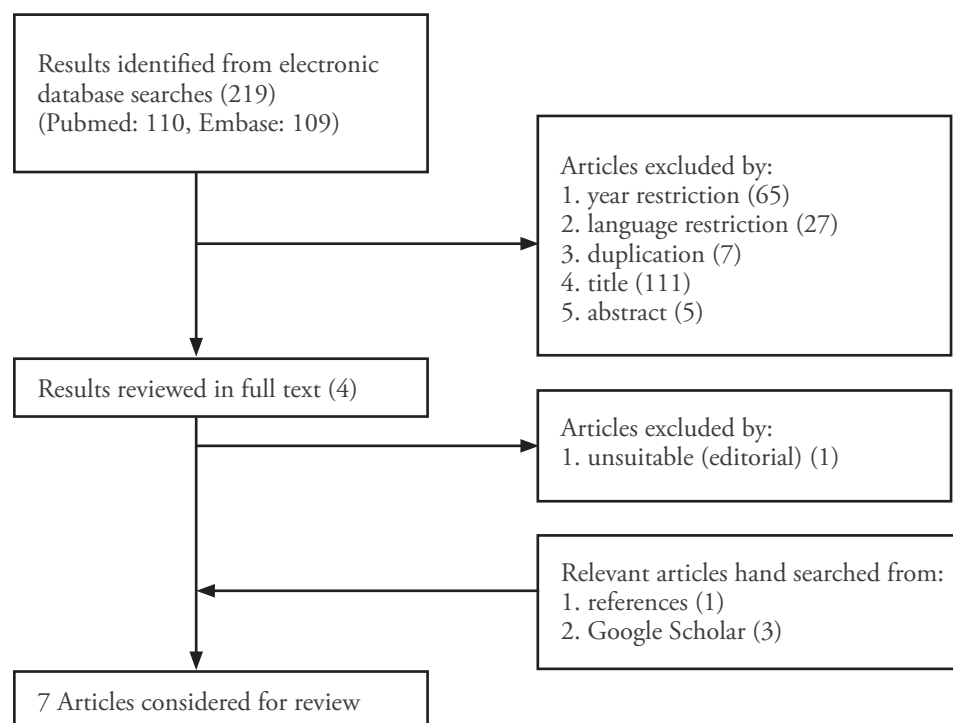


Figure 1. Flowchart of literature included for review.

Results

A total of 7 studies were considered for the final review. A summary of the studies can be found in **Table 1**, and a summary of the barriers faced by primary care physicians in providing house calls can be found in **Table 2**.

Table 1. Summary of studies.

Authors, year	Study design	Country	Sample population and size	Major findings
Weaver et al. (2000) ⁹	Cross-sectional mail survey	USA	45 physicians who are active participants in home care	Barriers include physicians being too busy with their own practice, home visits are unnecessary with readily available nurses/aides, and inadequate reimbursement.
Švab et al. (2003) ¹⁰	Cross-sectional questionnaires	Slovenia	118 general practitioners (GPs) from rural, semi-rural and urban areas	Older GPs, trainees, GPs from rural areas, and those with a higher proportion of elderly patients conducted more home visits.
Theile et al. (2011) ¹¹	Qualitative, semi-structured interviews	Germany	24 GPs in city and rural areas	Barriers include unpleasant or occasionally dangerous situations, restricted diagnostic options, poor controllability of consultations in the patient's homes, time-consuming nature, insufficient reimbursement, and doubting the additional value of home visits.
Hammett et al. (2013) ⁶	Cross-sectional 12-question survey	Canada	73 urban family physicians practicing in Victoria British Columbia	Lack of time, unsatisfactory remuneration, travel distances, lack of equipment or technical support, concern for personal safety and medical liability, and feeling unprepared or untrained were barriers.
Aksoy et al. (2015) ¹²	Qualitative, semi-structured interview	Turkey	26 physicians who provide home healthcare services (HCS) in an urban area	Reasons against HCS include excessive workload, a poorly developed legislative background of HCS, training needs of doctors (concerns about the quality of service), displeasure about misuse/abuse of service, unavailability of equipment and staff support, security concerns, and violence against healthcare staff.
Malik et al. (2017) ¹³	Cross-sectional mail survey	Canada	295 family physicians and GPs in an urban health region	The most substantial barrier to providing home palliative care was the time needed to provide home visits, provision of home visits during or after office hours, and personal/family commitments.
Soh et al. (2018) ³	Qualitative, one-to-one interview	Singapore	12 GPs	Concerns about the limitations perceived to be present during a house call and the resultant medico-legal implications was the most common barrier. GPs also struggled with charging appropriately for house calls and found them disruptive to their practices.

Table 2. Barriers to making house calls by primary care physicians.

Time-related concerns Too busy with own practice (patient load) ^{3,6,9,12,13} Time-consuming nature ^{3,11,13} Personal/family commitments ¹³
Money Inadequate reimbursement ^{3,6,9,11} Struggles on how to charge appropriately ³
Unconducive home environment Restricted diagnostic options ¹¹ Lack of equipment or technical support ^{3,6,12} Unpleasant or occasionally dangerous situations ¹¹ Poor controllability of consultations in patients' homes ^{3,11} Inadequate standard of care that can be achieved in the home compared to clinical setting ³ Uncertainty of an unfamiliar environment ³
Unnecessary Nurses or other professionals can make visits ⁹ Doubt additional value ¹¹
Others Concerns for personal safety ^{3,6,12} Concerns for medical liability ^{3,6,12} Uncertainty about the job definitions and responsibilities ^{3,12} Displeasure about misuse/abuse of service ^{11,12} Feeling unprepared or untrained ⁶ Lack of specific training in house calls ^{3,12}

Barriers to making house calls in urban areas versus rural areas

The different practice of providing house calls in different societies and healthcare systems will likely mean that challenges faced by primary care physicians in making house calls will also be different. Two studies (one conducted in Slovenia¹⁰ and the other in Germany¹¹) revealed that GPs from rural and semi-rural areas are more likely to conduct house calls compared to GPs from urban areas.

Švab et al. (2003) elucidated the fact that the restricted support from other sources that are otherwise involved in home visiting in rural areas led rural GPs in Slovenia to shoulder this task.¹⁰ This finding was echoed by Theile et al. (2011), where urban GPs in Germany seemed to be more secure regarding the consequences of not providing house calls given the high density of alternative emergency services in urban areas.¹¹ Regarding home visits of an urgent nature, concerns of dealing with a life-threatening situation were more prevalent among GPs from urban areas, where there is an excellent urban emergency ambulance system.^{3,11} Particularly for urban countries such as Singapore, the nearest hospital is usually less

than half an hour away.³ Rural GPs in such situations tend to perceive themselves to be competent first-aiders and feel that no one else knows the medical history of the affected patient as well as they do.¹¹ Hence, rural GPs were less likely to delegate such emergency house calls to the emergency services.¹¹

Studies also found underlying differences in attitude between urban and rural GPs regarding the provision of house calls.^{10,11} Švab et al. (2003) postulated that since rural GPs typically live where they practice, they are more attuned to the population needs and thus act more proactively in the provision of house calls. Theile et al. (2011) found that for home visits of a supportive nature, rural GPs tend to view patients as their real companions, not just someone they give medical advice to. Rural GPs are therefore more inclined to provide house calls.

Trends of barriers faced by primary care physicians in the last 20 years

Dissatisfaction with reimbursement among primary care physicians remains a pertinent barrier in the provision of house calls in the last 20 years.^{3,6,9,11} Concerns with time,

a home environment unconducive for providing clinically adequate care, and the sentiment that house calls are unnecessary are also barriers that have been consistently faced by primary care physicians in the provision of house calls. Interestingly, concerns with medico-legal issues in the provision of house calls have only surfaced in recent studies.^{3,6,9}

Discussion

Summary

Over the years, primary care physicians have generally sharpened their criteria for conditions that warrant a house call^{11,14} due to the various barriers mentioned above. Despite the different characteristics and nature of house calls in various countries, the barriers faced by primary care physicians in making house calls were similar across the world. Notably, the barriers are dissatisfaction with the amount of remuneration, lack of time and training, the limited standard of care one can achieve during a house call, professional liability risk, and safety concerns. These barriers are often interlinked with one another.³ For instance, the dissatisfaction with the amount of remuneration could stem from the amount of effort, time, pressure, medical liability risk and safety being compromised from making house calls.

Strengths and limitations

As studies included for this review were conducted in different countries with different healthcare systems and resources, results from one setting are not always necessarily transferable to another.

The paucity of studies further limits the generalizability of the findings. Literature included in this study for review ranged from 2000 to 2018, hence some of the barriers might be inapplicable to the current situation where the Malaysia and Singapore healthcare system, practice, and accessibility have considerably improved. However, results across the studies were reasonably consistent.

In addition, the number of relevant articles reviewed may be limited by using only the two databases PubMed and Embase. This limitation was addressed through the additional use of Google Scholar to hand-search for possible missed papers.

Implications for future research and recommendations

Despite widespread dissatisfaction with the amount of remuneration given for house calls, a recent study³ conducted in Singapore by Soh et al. found that GPs who were not making house calls did not think that monetary incentives would encourage them to make house calls. Similarly, a study conducted 29 years ago by Boling et al. found that only 49% of occasional house callers would increase the number of house calls made if reimbursement was made adequate.¹⁵ However, some physicians, despite financial disincentives, continued to provide house calls.¹⁶ This suggests that the decision to make house calls is not singly driven by economic reasons, but rather is a decision based on weighing multiple factors. Soh et al. (2018) posited that interest and circumstances are highly likely to play a significant role in deciding whether to make house calls.³ Given the lack of recent studies investigating the primary care physician's perspectives on house calls, further research can be done to explore the primary care physician's decision-making process in choosing to provide house calls. This research might reveal solutions to address these barriers that can be more relevant and targeted.

Primary care physicians who reported less positive attitudes about house calls were less likely to make house calls,^{3,9,12,17} and some found house calls unenjoyable.^{15,18} This inherent lack of interest must be addressed. The American College of Physicians, as well as a study by Soh et al. (2018),³ have pointed to a lack of education in house calls at the medical student and resident level.^{3,19} For medical students and family medicine residents, training can be incorporated into the medical curriculum and residency training with a mentoring system to expose students and residents to house calls and provide them with a professional role model. This would address the feeling of a lack of adequate training in providing quality care and role models,^{3,6,11} thereby encouraging young physicians to take up the practice when they go out on their own.⁸ For primary care physicians who are already practicing, training can cover aspects of time, logistics, and manpower management (see **Figure 2** for a suggested house call equipment checklist, adapted from Unwin et al. (2011)).

Figure 2. Suggested house call equipment checklist (subject to patient's needs and doctor's practice).

- ☐ Stethoscope
- ☐ Alcohol swabs/alcohol hand disinfectant
- ☐ Surgical mask
- ☐ Patient medical record card (if any)
- ☐ Thermometer with disposable probes
- ☐ Portable sphygmomanometer set (with various cuff size)
- ☐ Glucometer
- ☐ Gloves
- ☐ Torchlight
- ☐ Tongue depressors
- ☐ Pulse oximeter
- ☐ Medication(if any) and medication labels

Adapted from Unwin BK, Tatum PE. House Calls. Am Fam Physician. 2011;83(8):925-931

As for time-related concerns, strategies can include incorporating house calls into practice, scheduling visits before or after office hours, or incorporating a visit into other business or personal travel.^{3,20} A practice in which more than one doctor is present at any point in the clinic will be able to free the other doctor during clinic hours to make house calls.³ In addition, with the advances in information technology and smart healthcare concepts, the use of telemedicine (particularly teleconsultation and telemonitoring) are possible adjuncts or even substitutes to actual house call visits for busy primary care physicians to cut traveling time and triage patients according to their medical needs.

In relation to payment concerns, some primary care physicians faced the inconvenience of having to bring up issues of payment during a house call. To overcome this, primary care physicians can consider charging patients remotely through online funds transfers such as DBS PayLah or PayNow.¹⁰ Informing the requestors of the house call about the cost at the time of request might also reduce some of the awkwardness that primary care physicians feel when asking for payment.¹⁰

Recent years have seen concerns with medico-legal issues in the provision of house calls among primary care physicians.^{3,6,9} To address this issue, more guidelines are needed for:

1. Medical conditions that can be managed during house calls³
2. Lists of equipment to bring for house calls³
3. Medical indemnity during a house call³

These will offer doctors conducting house calls a guide to consult to prevent any medico-legal issues from arising. These guidelines should be crafted by a group of doctors and nurses who are familiar with the provision of house calls.

Conclusion

This literature review has consolidated the barriers faced by primary care physicians in making house calls. While primary care physicians do recognize the value of house calls in patient care,^{3,6,9} the perceived limited standard of care that can be achieved in the home setting, busy clinical practice (large patient loads) coupled with inadequate remuneration might make house calls impracticable for physicians. These barriers must be addressed to ensure primary health care services remain accessible to the immobile, frail, and sick and their health care needs are being attended to. One solution may be to expose medical students and residents to house calls early through mentorship.³ Recent years have also seen the rise^{5,9} of the home-based primary care model in the delivery of medical services due to changes in various demographic and organizational factors.²¹ However, such medical services are usually not delivered by physicians.⁹ To make care more clinically appropriate, continuous, and cost-effective, physicians should be more involved in house calls.^{9,21}

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Competing interests

None.

How does this paper make a difference to general practice?

- This literature review consolidates the barriers to making house calls from the perspectives of primary care physicians. This helps highlight the difficulties primary care physicians face in making house calls and possible solutions that can be undertaken to address these issues so that primary health care services by physicians remain accessible to the frail, immobile, and the sick.

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Basal Cell Carcinoma Surgery in general practice: Is there a role for the local General Practitioner?

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Abstract

Basal cell carcinoma (BCC) is a common disease of the skin caused principally by prolonged solar radiation exposure. It is normally a malignancy with favorable prognostic features and is potentially curable by standard excision. In White populations with high disease incidence, general practitioners (GPs) play a vital role in diagnosing and managing BCC, including surgical excision. Dedicated care at the primary care level by adequately trained GPs is conceivably cost effective for the health system and more convenient for the patient.

In Asia and other parts of the world with low incidence, this valuable role of GPs may appear to be inconsequential. In this regard, any justification for the involvement of local GPs in BCC surgery is debatable. This article aims to provide a clinical update on essential information relevant to BCC surgery and advance understanding of the intricate issues of making a treatment decision at the primary care level.

Case Report: Madam Tan, a 71-year-old Malaysian Chinese lady, otherwise healthy, presented to her local GP with a complaint of a nodule over the left cheek that had been there for more than a decade. Her concern was that the lesion was growing and had become conspicuous. She had spent most of her life as a farmer working in her orchard.

Upon examination, she had an obvious dome-shaped nodule over the left cheek measuring approximately 1.8 cm in diameter. The lesion was firm, pigmented, well-demarcated, and slightly ulcerated at the top. Clinically, she was diagnosed with a pigmented nodular basal cell carcinoma of the left cheek. Examination of the systems was unremarkable.

She requested that the consulting GP remove the growth. The cost for specialist treatment and waiting time at the local hospital were her concerns.

Clinical Questions: Can the basal cell skin cancer be excised safely and effectively in the local primary care setting? What are the crucial preoperative concerns?

Introduction

Basal cell carcinoma surgery in general practice is gaining a foothold. The pivotal role of general practitioners (GPs) in the diagnosis and management of basal cell carcinoma (BCC) is well established in a number of countries with high incidence of the disease, primarily in countries such as the UK and Australia.^{1,2} In the US, the role of primary care physicians in the diagnosis and management of skin cancers is increasingly important as the disease rises towards epidemic proportion.³ In other health systems, low-risk BCC is the target of substitution of care, from secondary to primary care.⁴

BCCs are often treated successfully as office-based procedures in primary care with surgical

excision, which remains the gold standard of treatment.⁵ The involvement of GPs may potentially result in earlier diagnosis, reduced health expenditure, and lessened demand for the over-stretched dermatology services.¹

In Asia, where the prevalence is much lower, these benefits may be less evident. However, with the aging population in the tropical environment, we are seeing an increasing number of older patients with BCCs. We believe that local GPs with special interest (GPwSI)⁶ in skin surgery and dermatology may play a role in the surgical treatment of the relatively straightforward or uncomplicated BCCs (low-risk BCCs) or managing patients who prefer primary care to specialist treatment due to circumstantial constraints. To explore this view further, we examine and present the evidence for or

against GPs performing BCC surgery and discuss the challenges and controversies involved.

Methods

To seek answers to the questions posed, we conducted a review on the subject of BCC surgery in general practice. The review includes summaries of the pertinent characteristics of this disease with regard to the epidemiology, clinical characteristics, diagnostic challenges, and preoperative risk assessment. We analyzed published articles on BCC examining the involvement of GPs and other specialties and made a list of relevant Clinical Practice Guidelines developed for BCC evaluation and management. Local studies and any characteristics of disease unique to Asians were inspected.

We performed a systematic literature search, on MEDLINE, using the National Library of Medicine PubMed interface, and a general search on Google using the keywords, *Basal cell carcinoma, epidemiology, clinical features, diagnosis and management, Non-melanoma skin cancers, Keratinocyte cancers, Basal cell carcinoma and General Practitioners, Surgical excision of BCCs, Incomplete excision of BCCs, and Clinical Practice Guidelines on BCC*. A secondary search for relevant local publications was done. Studies involving randomized control trials, cohort, case series, reviews, and miscellaneous clinical reports were retrieved and evaluated from 1990 to 2020. The study was carried out between Jan 2019 and Jan 2020. A total of 1022 articles containing abstracts and full-texts were screened and evaluated, of which 58 articles were cited in this review.

Results

Terminology

Non-melanoma skin cancers (NMSCs) is a term that encompasses a mixture of skin cancers including BCCs, squamous cell carcinomas (SCCs), cutaneous lymphomas, adnexal tumors, Merkel cell carcinoma, and other more rare tumors. Keratinocyte cancer comprises both BCC and SCC because they share the same cellular lineage from the epidermis. Keratinocyte cancers, of which approximately 80% are BCC, and 20% are SCC,⁷ form the major kinds of non-melanoma skin cancers.

The term keratinocyte cancer is more definitive and practical and will be increasingly encountered.

Epidemiology

NMSCs commonly affect Caucasian or White populations. Ultraviolet radiation is the main etiological agent associated with BCC. A light-skinned phototype is the most susceptible constitutional risk factor.⁸ Global warming and depletion of the ozone layer may have a role in the increasing incidence of skin cancers.⁹

NMSC incidence is increasing worldwide. BCC, the major component of NMSCs, is the most common malignancy in many countries worldwide.^{10,11} In Caucasian populations, BCCs are ubiquitous. For example, in the US, it was estimated that more than 3 million persons were treated for keratinocyte cancers in 2012.¹² Australia has the highest incidence of NMSCs in the world.¹³

In contrast, according to the Malaysian Cancer Registry Report 2012–2016, NMSCs only ranked as the ninth most common cancer in males and tenth in females.¹⁴ (Note that NMSCs were ranked tenth most common in males and fourteenth most common in females in the Malaysian Cancer Registry Report 2007–2011). BCC incidence rates may be significantly underreported because data for this tumor are not routinely collected by cancer registries, and notification is not mandatory.

In Asians, females are as likely to be affected as males, in contrast to Caucasian populations, where BCC is seen more commonly in men.¹⁵ Asians also develop BCCs at an older age and have fewer of these BCCs over their lifetime than Caucasians.¹⁶ The incidence rate of disease is inversely related to skin color (Fitzpatrick Skin Types I–VI); therefore, in the local multiracial mix, the incidence of BCCs is higher in Chinese than Malays or Indians.^{11,15,17,18}

The lower incidence of BCC locally suggests that local GPs may have relatively less experience with diagnosing and treating the disease. Potential for late diagnosis and delayed treatment of BCCs, particularly in the trunk and limbs, has been highlighted.¹⁵

Clinical features and diagnosis

BCC is derived from the basal layer of the epidermis. Its local destructive potential but rare metastasis may be explained by the characteristic presence of an angiogenic response in the stroma but a lack of microvessels in the body of the tumor.¹⁹ Incidence rates of metastasis have been reported to be from 0.0028% to 0.55%.²⁰ A retrospective cohort US study found that locally advanced BCC accounted for only 0.8% of all BCC cases.²¹ These excellent prognostic features present opportunities for appropriately trained primary care doctors to perform a gatekeeper's role by managing early and uncomplicated cases.

Recognizable clinical variants of the common BCC include the nodular, superficial, morpheioid, and ulcerated (rodent ulcer) types. The clinical and histological features of the main BCC types are tabulated in **Table 1** for easy reference. Note that the histopathological classification of BCC by Rippey²² is used. Some of the common findings in HPE reports are also given.

GP surgeons would be most interested in the nodular type, which is most amenable to curing with standard excision. In general, the nodular type of BCCs is the most common form, occurring in up to 75% of cases.²² The majority of BCCs seen locally, as well as in other parts of Asia, are also pigmented and have relatively distinct borders.^{15,23} This is in contrast with non-pigmented lesions, which are predominant in Caucasians.²⁴ According to the European consensus-based guidelines for diagnosis and treatment of basal cell carcinoma, more than 95% of BCCs can be classified as "easy to treat" with standard surgery or a range of alternative blind treatments early in the disease course.²¹

When diagnostic uncertainty occurs, it is best to refer the patient to a dermatologist, or a biopsy can be arranged. The best approach to biopsy is complete lesion excision if appropriate.¹ However, it is often safer for the GP to first perform an incisional biopsy for diagnostic and classification purposes, particularly if more aggressive subtypes are considered. This approach is necessary if the patient requires more complex surgery for clearance and reconstruction by more specialized doctors. It is mandatory that the GPs are trained in the correct technique of performing a skin biopsy.²⁵

Dermoscopy is a useful adjunct in the clinical diagnosis of keratinocyte cancers but is not commonly available in the GP's office. Evaluation with a dermatoscope is more accurate than visual inspection alone for BCC detection.²⁶ A dermatoscope is essentially a handheld instrument containing a high-quality magnifying lens and a powerful light source (both polarized and non-polarized). During dermoscopy, the area to be examined is typically covered with some oil and the dermatoscope applied to the skin when viewing. Optimum use requires training. Dermoscopic criteria for BCC²¹ includes:

1. Absence of pigment network
2. Arborizing and superficial telangiectasia
3. Multiple erosions
4. Ulceration
5. Ovoid nests and globules and focused dots
6. Leaf-like areas
7. Spoke-wheel areas
8. Concentric structures.

Table 1. Clinical and histopathological features of the main basal cell carcinoma types

	Histopathological Classification (Rippey)	Distinctive clinical features	Histological features
1.	Nodular type	<i>Classical variant</i> 'Pearly' translucent papule or nodule Reddish, smooth surface, firm Distinct border Telangiectasia Bleeds easily with contact	Tumor cells with scanty cytoplasm with round large nucleus (basaloid cells) Basaloid cells arranged in nests, lobules or nodular sheets with peripheral palisading Nuclear pleomorphism Retraction artifact of tumor cells from surrounding stroma Increased mitosis Chronic inflammatory cellular infiltrate in subepithelial stroma Other features: myxoid changes, calcifications
		<i>Ulcerative variant</i> Central atrophy Rolled border is distinct	Epidermis missing Tumor infiltrating into epidermis causing ulceration.
		<i>Pigmented variant</i> A range of stippling of melanin pigmentation may impart a bluish, brown or black color May resemble melanoma but a rolled translucent border gives away the diagnosis.	Melanocytes seen Melanin pigments seen in the tumor cells
2.	Superficial type	Well-demarcated reddish scaly plaques. Looks like eczema but does not itch. Characteristic raised border may be retained	Sheets of tumor cells attached and confined to the undersurface of the epidermis only
3.	Infiltrative/ morpheaform/ sclerosing type	Morphea-like Scar-like Ill-defined border Mixed skin colored, whitish and pigmentation	Basaloid strands of tumor cells spreading in a spiky irregular fashion. Cords, strands, islands of tumor cells infiltrating into the dermis Dense fibrous stroma seen Perineural infiltration Perivascular infiltration

Assessment of risk factors for recurrence:

Outcomes of surgical excision can be studied in terms of completeness of excision or of tumor recurrence rates. Factors affecting these outcomes may be categorized as:

1. Tumor-related factors, which include location, size, histologic types, borders, and primary or previously excised lesions.
2. Patient-related factors, which include patient's immunity (immunosuppression), coexisting medical conditions, and site of previous radiotherapy.
3. Operator-related factors, which can be analyzed in terms of personnel (GP, dermatologist, plastic surgeon, etc.) experience, surgical techniques (standard excision, Mohs micrographic surgery), and surgical margin width (applicable for standard excision).

Although there are a considerable number of studies in the literature addressing these issues, good-quality research in terms of randomized controlled trials is scarce.⁵

Tumor factors

Location

Certain anatomical sites solely, barring histologic types, confer a higher risk of tumor recurrence after excision than other areas. BCCs occur most frequently in sun-exposed areas; as a consequence, the head and neck region is the most common site. 75–85% of lesions occur in the head and neck region²⁷ and the rest in the trunk and extremities. Tumors in the head and neck generally have a higher risk of recurrence than the rest of the body. Within the head and neck region itself,

there are areas that are at higher risk than others. These high-risk zones or H-zones are depicted in **Figure 1**. The risk profiles are also related to the lesion size.²⁸

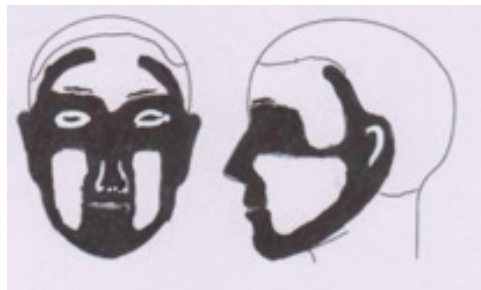


Figure 1: The H-zone or high-risk areas - includes the central face, eyelids, periorbital, nose, lips, chin, mandible, preauricular and postauricular skin/sulci, temple, ear.

The surgeon must also consider other aspects of the surgical risks, principally injuries to vital structures such as nerves, tear ducts, eyelids, and mouth. A few areas where BCC commonly occurs present problems with direct surgical closure. For example, the skin around the tip of the nose and nasal alae are thick, noncompliant, and unforgiving, precluding the ease of primary closure of any defect. Similarly, the anterior and lateral part of the ears contains little subcutaneous tissue between the skin and cartilage, resulting in extremely tight attachment and, therefore, direct closure of the surgical defect will be difficult.

Tumors located in the periocular region, nasal, and nasolabial folds and the auricular region are shown to be more aggressive and infiltrative.²⁹ Infiltrative extensions into adjacent vital structures can cause serious complications. Extreme care should be exercised when dealing with tumors in these areas, with a low threshold for referral being a rational thing to do. For example, for tumors in the periocular region, even if less than 1 cm, care needs to be taken to avoid postoperative complications such as ectropion. Facial BCCs in the high-risk zone may require the Mohs microsurgical technique for clearance, particularly those that had a recurrence after previous excision.^{30,31}

Mohs micrographic surgery is a tissue-sparing surgical approach first developed by Frederic E. Mohs in 1938. During surgery, consecutive layers of tissue are excised circumferentially around and deep to the clinical margin of the tumor for frozen section. After each removal of tissue, the surgeon waits for the tissue to be

examined by the pathologist for cancer cells. Further tissue layers are removed and studied until all cancer tissue are completely cleared in a process termed complete circumferential peripheral and deep margin assessment (CCPDMA). The final surgical margin is comparatively small, and the cure rate is high.

Size

Any BCC larger than 2.0 cm diameter or of long duration is considered high-risk for extensive subclinical spread.^{20,29} High-risk criteria for BCC include tumors > 2 cm on the trunk or extremities or > 1 cm on the head and neck, hands, feet, genitalia, or shins.³² The main challenge for GPs in large tumors will be primary closure of sizable post-surgical defect.

Histology

BCCs can be classified histologically by their growth pattern or cell differentiation. Classification by histological growth pattern is the most useful biologically and clinically.²² Rippey's classification is adopted here for its simplicity and practicality.

The infiltrative/morpheaform/sclerosing type represents the high-risk type with predilection for subclinical spread, aggressive local behavior, and resulting in higher rates of incomplete excision. Aggressive local spread can cause difficulty in total clearance and poor cosmetic results. Deep infiltration into vital structures can lead to severe complications.

The nodular type, which has numerous phenotypic variants, is low-risk. In Asians, pigmentation appears to be a favorable prognostic factor in terms of recurrence risk after excision.²³ The local ones are predominantly pigmented and have distinct borders (a low-risk attribute).

Other factors

The risk for tumor recurrence increases for lesions that require recurrent excision. A quick checklist of high-risk features of BCCs for GPs is given in **Table 2**. These lesions are likely difficult to treat, and referral should be considered. For guidance in matching a low-risk BCC for management by a suitably trained GP, the NICE guidelines (see below) are most useful.

Table 2. High risk features of basal cell carcinoma

Patient-related factors	Immunosuppression: eg. AIDS, Transplant recipient
	Site of previous radiotherapy
	Recurrent or incompletely excised lesions
Tumor-related factors	Location: H-zone, independent of size
	Size: - >2cm (trunk and extremities) - >1cm (head and neck, hands, feet, genitalia or shins) Border: Indistinct border
	Clinical: growing rapidly, infiltrative or local spread
Histology (result of biopsy)	Infiltrative/morpheaform/sclerosing type

Guidelines

The following clinical practice guidelines (CPGs) on the management of BCCs provide useful recommendations for treatment decisions, although they are not to be taken as an absolute standard of care. The articles should be consulted for details. The first two references are principally directed to GPs. A brief mention of pertinent points is given.

- A. National Institute for Health and Clinical Excellence (NICE) guidance on cancer services relating to the management of low-risk BCCs in the community (May2010)²

NICE provides up-to-date guidance for improving outcomes for people with skin tumors, including melanoma. The 2010 update includes recommendations on the management of low-risk BCCs in the community. GPs play the role of gatekeepers with the management of the low-risk BCCs and referral of high-risk lesions to secondary care. The proposals in the CPG suggest models of care aiming to match the skills of the healthcare professionals, including suitably trained GPs to the risks associated with BCC surgery, which are principally inadequate excision and poor cosmetic results. The objective is to identify suitable low-risk BCCs and triage them to be managed by three groups of health professionals in primary care, summarily:

1. Directed enhanced services/local enhanced services (DES/LES) GP surgeons: These GPs have no special interest or training in skin cancer and are expected to handle low-risk BCCs in anatomical sites where excision is easy, and closure is not difficult. These are generally uncomplicated lesions

located anatomically below the clavicle and less than 1cm in diameter with clearly defined margins.

2. Model 1 practitioners: These practitioners are GPwSI trained and accredited in the management and excision of BCCs in the community. Their spread of coverage of low-risk cases is somewhat expanded.
3. Model 2 practitioners: These are medical practitioners performing skin surgery in the community setting or specialist nurse operators that have their cases reviewed and approved by a multidisciplinary team member.

- B. Cancer Council Australia Keratinocyte Cancers Guideline Working Party. Clinical practice guidelines for keratinocyte cancer. Sydney: Cancer Council Australia (Jan 2020)¹

This new keratinocyte cancer guidelines document is a revision of the Clinical Practice Guide for management of BCC, SCC, and related lesions developed by the Australian Cancer Network in 2008. The guide is most useful for Australian GPs because they provide the majority of care for those suffering from non-melanoma skin cancers. Although the guide is not prescriptive per se, its general intention is to provide information for appropriate practice. GPs need to be aware of their own limitations and must be able to demonstrate an ability to refer appropriately. The guide generally indicated what kinds of lesions are within the scope of a GP with experience and confidence in surgical procedures.

- C. National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in Oncology Version 1.2016. Basal cell Skin Cancer (US)²⁸

This CPG is regularly updated. The CPG provides up-to-date and evidence-based recommendations for the evaluation and management of BCC. The section on risk stratification is extremely useful. Risk factors for tumor recurrence are listed and include factors found in history and physical examination and in the tumor's pathology. Anatomic location has been risk stratified into high, moderate, and low risk:

Area H: The high-risks area – includes the central face, eyelids, periorbital, nose, lips, chin mandible, preauricular and postauricular skin/sulci, temple, ear, genitalia, hands, and feet.

Area M: The moderate-risk area – includes the cheeks, forehead, scalp, neck, and pretibia.

Area L: The low-risk area – includes the trunk and extremities (excluding pretibia, hands, feet, nail units, and ankles).

The tumor size is also factored in when determining risks.

D. Diagnosis and treatment of basal cell carcinoma: European consensus-based interdisciplinary guidelines 2019²¹

The European consensus-based interdisciplinary guidelines for the diagnosis and treatment of BCC published in 2019 proposed a new approach where BCCs are conveniently and practically categorized as either “easy to treat” (common) BCC or “difficult to treat” BCC taking into account a variety of factors.

Discussion

Case

Madam Tan is a typical local patient diagnosed with a BCC, namely an older, Chinese, and outdoor worker with cumulative sun exposure. The location of the tumor at the cheek, and a size of >1.0 cm, put her in the high-risk category, according to NCCN.²⁸ On the other hand, the lesion can be considered relatively “easy to treat” in view of a number of favorable factors. These are the well-defined border, pigmented nodule in clinical appearance, not located in the H-zone, primary not recurrent tumor, lack of co-morbidities, and patient preference/acceptance for primary care treatment. Surgery was performed in the general practice setting, and a 3 mm surgical margin was chosen. Primary closure

was possible because the skin in the area was lax. Histology revealed a nodular BCC, and the surgical margins were found to be clear. Surgical outcome was satisfactory (**Fig. 2**).

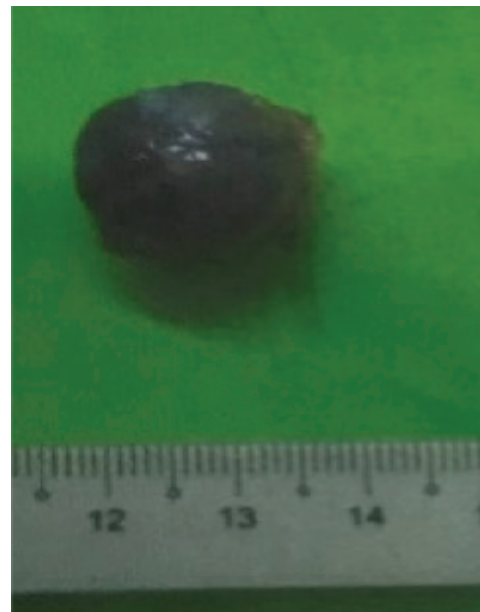


Fig 2: Pathology laboratory specimen showing the 1.8 cm pigmented dome-shaped tumor excised from the left cheek. Note the normal post-excision tissue shrinkage obscuring the margin of excision. Postoperative wound healing at 2 weeks is also shown.

Surgery

The majority of low-risk BCCs can be managed by standard excision and direct wound closure.¹ Standard BCC excision is a minor operation under local anesthesia in which a piece of elliptical skin is excised containing the lesion together with a

surrounding margin of normal tissue. The skin specimen is tagged for orientation and sent for histopathological examination. The pathologist examines the lateral and deep borders of the specimen for adequacy of tumor clearance, determines the histological type of the BCC, and seeks evidence of perineural, vascular, or lymphatic spread. An incomplete excision is defined as the presence of tumor histopathologically at the surgical edge or at a distance of less than 0.5 mm from it.³³ The wound defect is typically closed using sutures.

Although not the focus of this review, GPs need to be aware of the extensive range of non-surgical treatment alternatives for BCC. Many low-risk tumors can be managed with destructive techniques (curettage alone, curettage with electrodesiccation, cryosurgery), photodynamic therapy, or topical drugs (e.g., 5-fluorouracil, imiquimod). On the other hand, advanced or inoperable BCC may be treated by radiotherapy or hedgehog pathway inhibitors.³⁴ The indication for these options may need to be individualized, and working with a friendly dermatologist is the most suitable approach.

Objectives

The primary objective of surgery for BCCs is the complete removal of all tumor tissues. The secondary objectives are to ensure minimal sacrifice of surrounding normal healthy tissue, preservation of function, and obtaining optimal cosmetic results. Additionally, the aim for most practitioners is to be able to achieve primary skin closure. It is also economically likely to be most beneficial if surgical treatment can be completed at first contact by an appropriately trained GP.¹

Margins

The ability to recognize the clinical margin between normal and diseased tissues is the key to a successful complete excision.³⁵ Estimating the margin of excision is not an exact science. To date, there have been no randomized control trials studying the relationship between surgical excision margins and tumor recurrence rates. The recommendation for lateral surgical excision margin for normal low-risk non-pigmented nodular BCC of Caucasians is a 4-mm margin.³⁶ The Asian pigmented nodular BCCs have well-demarcated or distinct borders, and a 2–3-mm margin was found to be adequate.^{23,24,37,38} In general, from a meta-

analysis of the literature of 16,066 BCC excisions, a 3-mm lateral surgical excision was found to be safe for non-morpheaform BCC to achieve a 95 percent cure rate for lesions 2 cm or smaller.³⁹ The rates for incomplete excision are usually determined from specimens sent to the laboratory for histopathological examination. Reported rates of incomplete excision of BCC vary from 5% to 25% among centers worldwide.⁴⁰

Controversy

Traditionally, skin cancer surgery falls within the confines of dermatology and plastic surgery for the most part. Other involved specialties include general surgery, ENT, maxillofacial surgery, and ophthalmology. Hospital-based BCC management is costly.⁴¹ The involvement of general practice in skin cancer management is inevitable in many countries with high disease incidence because the potential for cost savings and reduction of specialist waiting times is evident. Controversies arise when the diagnosis and treatment of the disease are not carried out to expected standards.

Numerous studies have been performed comparing GPs with dermatologists and other specialists in their ability to make precise cutaneous diagnoses. Many of these studies, using real clinical cases and clinical photographs, showed that GPs performed significantly less well than dermatologists or other specialists when diagnosing skin cancers.^{42,43,44,45,46,47}

Solutions to this deficiency have been examined. Firstly, training and ample clinical experience with the disease has been shown to increase the diagnostic skills of practicing GPs.^{47,48,49} Secondly, the deficiency in diagnostic skills can be offset if GPs can demonstrate the ability to refer and biopsy appropriately.^{48,50}

The concept of GP-led BCC skin cancer management is still evolving in countries with high disease incidence. The surgical skills and training of individual GPs vary considerably due to their diverse backgrounds. Controversy occurs when there is a significant difference in the surgical outcome measures between GPs and specialists. An incomplete excision of a BCC entails the burden of further excision, cost, and anxiety. The preponderance of available studies showed that GPs performed significantly less well

than dermatologists or other specialists when excising skin cancers.^{43,51,52,53,54} Some believe that dermatologists are better at judging the tumor edge and, hence, have the lowest levels of incomplete excision.^{43,52} Others have found that GPs did not perform as well as dermatologists because GPs tend to excise BCCs with a significantly smaller cut margin.⁵⁵ It was postulated that GPs excised inadequately, particularly for lesions in the head and neck region, due to cosmetic concerns.⁴³

Competency in surgical expertise comes with training and experience. In Australia, GPs have expanded their surgical capabilities beyond the fundamental aspects. Besides standard excision for skin cancers, GPs are increasingly using skin flaps for repair. In a number of Australian states, the GPs performed more skin cancer surgeries than specialists and nationwide, GPs outperformed specialists.⁵⁶

In a paper entitled “Are there sufficient numbers of low-risk basal cell carcinoma to justify general practitioners (family physicians) carrying out basal cell carcinoma surgery”, investigators in the UK highlighted that it would be difficult for their GPs to maintain competency to perform effective skin surgery in view of the low numbers of low-risk BCC suitable for GP surgeons.⁵⁷ In this latter study carried out between Jan 2012 and Sept 2014, out of 1,743 BCCs excised from a population of over 700,000, only 3% met NICE criteria for being low risk and suitable for excision by their DES/LES GP surgeons. The percentage of lesions suitable for excision by Model 1 GP was only 15.1%.

In light of such findings, extrapolated to local settings with low clinical exposure, maintenance of competency for local GPs will be difficult. Hence, in regions with low disease incidence, the question remains whether it is appropriate for GPs to be involved in BCC surgery. Practically speaking, adequately skilled GPwSI may manage the uncomplicated low-risk lesions on an

individualized basis. Conceivable benefits include lowering cost and providing comfort and convenience⁵⁸ to patients who do not mind being treated by GPwSI. There are no local guidelines or controlled trials involving GPs and BCC skin cancer surgery to lend support.

Conclusion

The value of early diagnosis and management of low-risk BCCs by GPs has been demonstrated in healthcare institutions with a high volume of skin cancers. The evidence does support the notion that BCCs can be safely and effectively excised by GPs as office-based procedures, provided the GP surgeon is adequately experienced and skilled.

In the local setting, the experience of GPs is limited by low caseloads and, therefore, involvement would likely be confined to GPs with the relevant skills and interest. There is a notable lack of local studies or guidelines to support involvement of GPs in BCC surgery. Currently, it appears preferable that GPs should refer all cases for specialist management except for specific circumstances, whereby the arrangement is not appropriate, or the patient prefers primary care management. An alternative possible view is for local GPwSI to independently match their own skills and experience to the risk level of the BCC cases to be operated upon. Clinical Practice Guidelines such as those of NICE can be used as a model of care. However, the ultimate verdict regarding the propriety of this approach must be made by the doctor and the patient.

At this point of time, we could at best present the evidence and hope that this review will broaden the theoretical and practical perspectives of our local GPs and will position them to make a rational decision for the patient who requires BCC surgery. Increased primary care involvement in the diagnosis and management of skin cancers is a potential area for advancement in the local healthcare scene.

How does this paper make a difference to general practice?

- Basal cell carcinomas (BCCs) are often seen in general practice. Patients may seek advice for a lesion, or the doctor noticed the disease while treating the patient for some other complaint.
- BCCs typically have favorable prognostic features, and surgical excision is the mainstay of treatment.
- In Caucasian populations where incidence is high, BCC surgery is a common procedure in primary care. BCC incidence is much lower in the Asian setting, and primary care practitioners may have less experience in managing BCC, resulting in neglect or delayed treatment.
- We discuss BCC surgery's performance when carried out by local general practitioners with special interest (GPwSI) in minor surgery/dermatology. Is there an identifiable role?
- The article creates awareness, provides an update for GPs, and gives evidence-based data to inform treatment decisions in BCC's surgical management.

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Validity and reliability of the Patient Activation Measure® (PAM®)-13 Malay version among patients with Metabolic Syndrome in primary care

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Abstract

Introduction: The Patient Activation Measure (PAM) is one of the most extensively used, widely translated, and tested instruments worldwide in measuring patient activation levels in self-management. This study aimed to determine the validity and reliability of the PAM-13 Malay version among patients with Metabolic Syndrome (MetS) attending a primary care clinic.

Methods: This work is a cross-sectional validation study among patients with MetS attending a university primary care clinic in Selangor. The PAM-13 Malay version underwent a validation process and field testing. Psychometric properties were examined using principal component analysis (PCA) with varimax rotation, scree plot, Monte Carlo simulation, internal consistency, and test-retest reliability analyses.

Results: The content of the PAM-13 Malay version and the original version were conceptually equivalent. The questionnaire was refined after face validation by 10 patients with MetS. The refined version was then field-tested among 130 participants (response rate 89.7%). The Kaiser–Meyer–Olkin test was 0.767, and Bartlett’s test of sphericity was ≤ 0.001 , indicating sampling adequacy. Two factors were identified and labeled as (1) Passive and Building Knowledge, and (2) Taking Action and Maintaining Behavior. These labels were chosen as they were conceptually consistent with the items representing the levels of activation in PAM-13. The validated PAM-13 Malay version consisted of 13 items, framed into two domains. The overall Cronbach’s α was 0.79, and the intraclass correlation coefficient was 0.45.

Conclusions: The PAM-13 Malay version is valid, reliable, and fairly stable over time. This questionnaire can be used to evaluate the levels of activation among patients with MetS in primary care in Malaysia.

Introduction

The World Health Organization defines patient empowerment as a “process through which people gain greater control over decisions and actions affecting their own health.”¹ To be empowered, patients need to understand their role to be more active, responsible, and participative.² Patients also need to improve their knowledge and skills concerning their health and treatment options, be able to carry out self-care action in a competent manner, and improve their self-efficacy.²

The chronic care model seeks to empower patients to take an active role in their care and supports self-management.³ The model promotes a health care system redesign that enables proactive healthcare teams to interact with informed, activated patients. Patient activation is therefore defined as “the state in which an individual possesses the knowledge,

skills, and confidence to take independent actions to manage their health and care.”^{4,5} Being an activated patient in one’s own self-care has been shown to be associated with better health outcomes and cost savings.⁶ Patient activation has been shown to improve health-related behaviors including self-management, disease prevention, and health information-seeking.^{6–8} Activated patients have also been shown to have a better quality of life, greater satisfaction with care, improved adherence, better knowledge, increased health status, and lower utilization of health care services.^{6–9}

Patients with chronic conditions such as metabolic syndromes (MetS) often need to adhere to complicated treatment regimes, self-monitor their conditions, make changes to their lifestyle, and make decisions about when they need to seek advice from the healthcare team and when they can self-manage a

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problem on their own.¹⁰ MetS patients need to be actively involved in self-managing their chronic conditions in order to improve clinical outcomes. Effectively, an individual with multiple chronic conditions such as MetS needs to be an activated patient. This would require a high level of knowledge, skills, and confidence, and these patients need to be empowered with such attributes and skills.^{7,10}

Tools to measure patient activation and empowerment have been developed by various researchers in the form of questionnaires.¹¹ These include the Patient Activation Measure (PAM),^{4,12,13} Patient Empowerment in Long-Term Conditions,² Patient Enablement Instrument¹⁴ and Self-Efficacy in Long-Term Conditions.¹⁵ PAM is one of the most extensively used, widely translated, and tested instruments worldwide for measuring patient activation level in self-management. It was originally developed as a 22-item questionnaire in the English language using the Rasch model.⁴ This questionnaire identifies four domains of patient activation (knowledge, skills, confidence, and behaviors) and suggests four levels of activation patients reach in becoming fully engaged in managing their own health.^{4,12} The PAM 13-item short version (PAM-13) was subsequently developed, and it was proven to have the same psychometric properties as the longer version.¹² PAM-13 has been validated among adults with various conditions,¹⁶⁻¹⁸ and it has been translated into various languages,¹⁹⁻²⁵ including the Malay language.

To date, no study in Malaysia has specifically measured patient activation or empowerment. The PAM-13 questionnaire has been translated into the Malay language by Insignia Health, University of Oregon.²⁶ However, it has not yet been validated in the Malaysian primary care population. Hence, there is a need to validate this tool to measure the levels of patient activation in primary care, as studies concerning this area in Malaysia is severely lacking. Due to its robust development and extensive utilization worldwide, PAM-13 would be the best questionnaire to be validated in the Malay language. Therefore, the objective of this study is to determine the validity and reliability of the PAM-13 Malay version among patients with MetS attending a primary care clinic.

Methods**Study design and population**

This cross-sectional validation study was conducted as part of a larger study, that is, the EMPOWER-SUSTAIN e-health pilot randomized controlled trial to improve patient activation and self-management behaviors among individuals with MetS in primary care.²⁷ The study population was patients with MetS attending the Universiti Teknologi MARA (UiTM) primary care clinic in Selangor, Malaysia. Conducted in two parts, the study is based on the CONsensus-based Standards for the selection of health Measurement INstruments (COSMIN) guideline.²⁸ Part 1 was the content and face validation of the PAM-13 Malay version, and Part 2 was the field testing and psychometric analysis of the questionnaire. The conduct of the study is outlined in the flow chart presented in Figure 1.

Stringent eligibility criteria were set as this validation study was part of a pilot randomized controlled trial where the PAM-13 Malay version will be used as a tool to measure the primary outcome. The inclusion criteria were as follows: (a) aged 18–80 years old; (b) attended the university primary care clinic for at least one year; (c) had blood investigations [Fasting Plasma Glucose (FPG), Fasting Serum Lipid (FSL) and HbA1c] done in the last 3 months; (d) were able to read and understand the Malay language; (e) fulfilled at least 3 out of 5 diagnostic criteria for MetS based on the 2008 Joint Interim Statement definition²⁹ [i.e., waist circumference South Asian cut-points: male ≥ 90 cm, female ≥ 80 cm; systolic blood pressure (BP) ≥ 130 and/or diastolic BP ≥ 85 mmHg or on treatment for hypertension (HPT); FPG ≥ 5.6 mmol/L or on treatment for elevated glucose; triglycerides (TG) ≥ 1.7 mmol/L or on treatment for dyslipidemia; high-density lipoprotein-cholesterol (HDL-C): male < 1.0 mmol/L, female < 1.3 mmol/L or on treatment for dyslipidemia]; and (f) willingness to participate in the study.

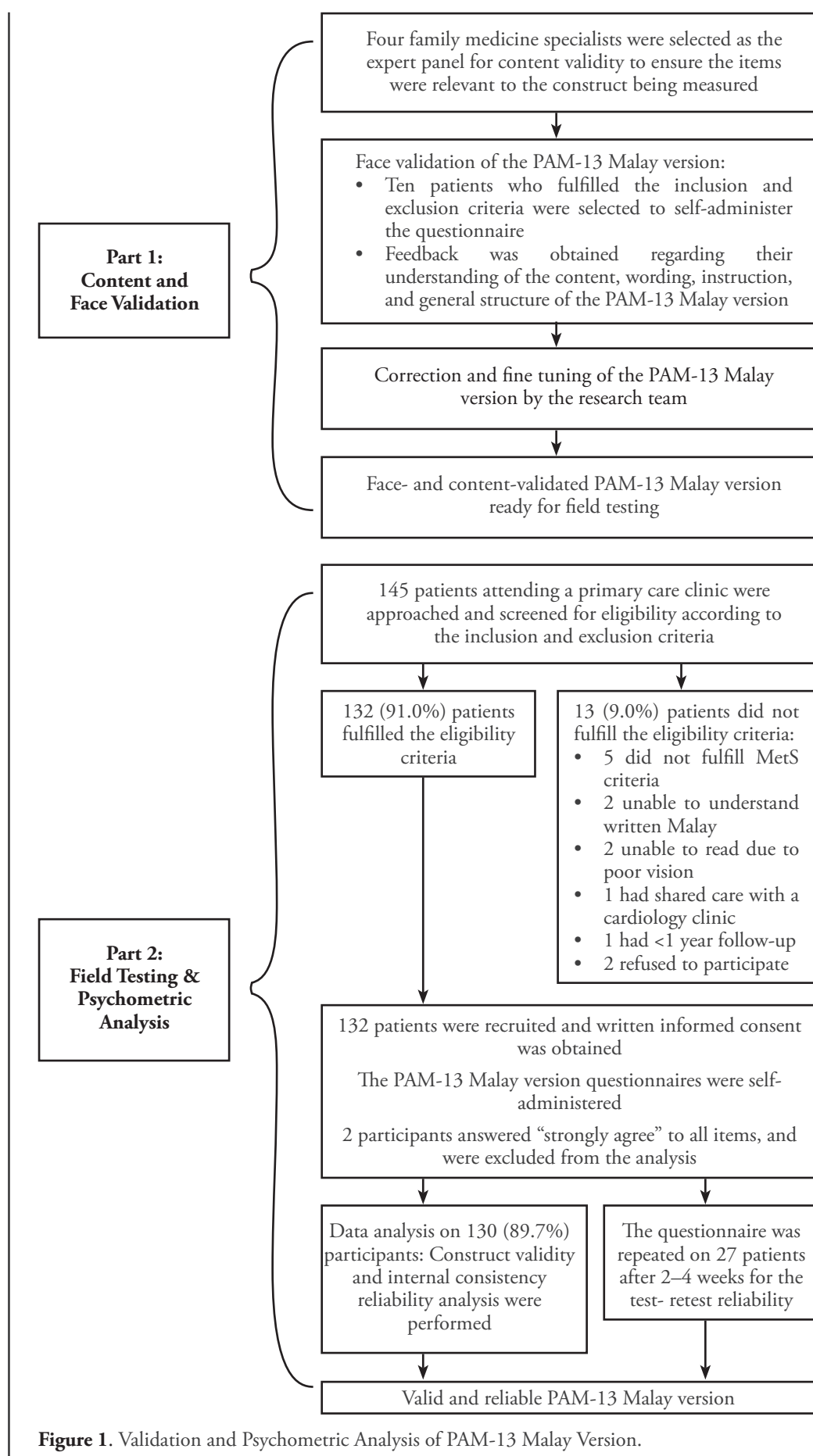


Figure 1. Validation and Psychometric Analysis of PAM-13 Malay Version.

The following patients were excluded from the study: (a) on renal dialysis, (b) presented with severe HPT (systolic BP >180 mmHg and/or diastolic BP >110 mmHg), (c) had secondary HPT, (d) diagnosed with circulatory disorders requiring secondary care over the past year (e.g., unstable angina, heart attack, stroke, transient ischemic attacks, peripheral vascular disease), (e) received shared care at primary and secondary care centers for complications of type 2 diabetes mellitus (T2DM) and/or cardiovascular diseases, (f) pregnant, (g) enrolled in another intervention study, (h) diagnosed with malignancy, (i) had any form of mental disorder or cognitive impairment that would affect the ability to answer the questionnaire, for example, dementia or mental retardation, and (j) unable to give informed

consent.

* *MARA stands for Majlis Amanah Rakyat.*

Study tool

The PAM-13 questionnaire consists of 13-items that form a Guttman-like scale with strong psychometric properties.¹² The PAM items are framed within 4 domains, that is, knowledge, beliefs, confidence, and skills about managing one's health.^{4,12,13} Each item is answered based on a 4-point Likert scale, ranging from "strongly disagree" to "strongly agree" and "non-applicable." The scale reflects the four stages of activation in a progressing difficulty.^{4,12,13} **Table 1** shows the categorization of the PAM-13 activation levels, scores, definitions, and items.

Table 1: PAM-13 activation levels, scores, definition and items.

Activation Level	Activation Score	Definition	Item
Level 1	0–47	A belief that their role is important	Items 1 and 2
Level 2	47.1–55.1	Have confidence and knowledge to act	Items 3–8
Level 3	55.2–72.4	Taking action	Items 9–11
Level 4	72.5–100	Staying on course under stress	Items 12 and 13

The score was then transformed to a scale with a theoretical range of 0–100, based on calibration tables, with higher PAM scores indicating higher patient activation. Written permission from the questionnaire developer and license to validate the PAM-13 Malay version was granted and approved by the Insignia Health prior to the conduct of the study.^{4, 12, 13}

Content validation

Content validation was conducted by four family medicine specialists who are experts in questionnaire validation methods. All of them are also clinical experts with a special interest in patient empowerment and chronic disease management. Definition of the domains and the items representing the domains were provided to the experts. They were requested to critically review the domains and items, and rate the relevance of each item to the conceptual framework on a scale from 1 to 4 (1 = not relevant, 2 = not important, 3 = relevant, 4 = very important) for each item. Prior to the calculation of the content validation index (CVI), scores of 1 and 2 were categorized as 0, whereas scores of 3 and 4 were categorized as 1. CVI was calculated by adding up these values (0 or 1) for each item, and then the total value was divided by the

total number of experts. A CVI value of >0.8 determined that the items were relevant and to be retained in the questionnaire.³⁰

Face validation

The PAM-13 Malay version was tested on a sample of 10 patients who fulfilled the inclusion and exclusion criteria. The questionnaire was self-administered. The time taken to answer the questionnaire was noted. Their opinions on understanding the instructions, contents, wording, and general structure of the questionnaire were assessed. The result was reviewed by the research team to ensure that all the items were comprehensible. Correction and fine-tuning of the PAM-13 questionnaire items by the research team were conducted based on the feedback from the patients. This process produced the refined PAM-13 Malay version, which was ready to undergo the psychometric evaluation.

Field testing and psychometric evaluation

The refined PAM-13 Malay version was field-tested among patients who fulfilled the same inclusion and exclusion criteria as previously described.

Sample size determination

The sample size was calculated using the sample to variable ratio of 10:1, giving a minimum required sample size of 130 patients.³¹ After taking into consideration a 10% non-responder and non-eligibility rate, this study aimed to approach 143 patients.

Sampling method

This study was conducted using a convenience sampling method until the target sample size was achieved. This sampling method was chosen as there was difficulty in conducting probability sampling due to the absence of an electronic registry for patients with MetS. To minimize sampling bias, consecutive patients were approached and screened for eligibility according to the inclusion and exclusion criteria on the designated day of data collection.

Patient recruitment and data collection

Patients were recruited over four weeks at UiTM primary care clinic in June–July 2019. Data were collected by a trained research assistant to ensure a standardized data collection method was followed. Patients were approached in the nurse's assessment room and invited to participate. Those who were interested were given the study information sheet containing valuable information pertaining to the study, which included the background, purpose, benefit, information regarding participation, the study procedure, confidentiality status, and contact information. Patients were screened for eligibility according to the inclusion and exclusion criteria. Screening for the eligibility criteria was made through a self-administered questionnaire and a review of the medical records. Patients' medical history and blood investigations were required to make the diagnosis of MetS. FPG and FSL, as well as HbA1c (for those with diabetes), were retrieved from the electronic medical record. Those who fulfilled the eligibility criteria and agreed to participate were recruited. Written informed consent was obtained.

The PAM-13 Malay version was given to the participants to be self-administered. Participants were reminded to complete the questionnaire in approximately 15 minutes without referring to notes or family members. Clear verbal instructions were given on how

to fill up the questionnaire. The participants were free to ask for clarification from the researcher at any time should any query arise. Once completed, participants were requested to return it to the researcher, and the questionnaire was checked for completeness.

Data collection for test-retest

Thirty patients were recruited to participate in the test-retest of the PAM-13 Malay version. Patient selection was based on logistic reasons. Those with an appointment, either for a routine clinic follow-up or blood draw within 2–4 weeks, were offered to participate. They were given a date to return to the clinic if they agreed to participate. Twenty-seven patients returned to the clinic after 2 to 4 weeks, and they were given the same questionnaire to complete for the test-retest reliability analysis.

Statistical analysis

Data entry and statistical analysis were performed using IBM SPSS Statistics Version 24. Continuous variables were expressed as means and standard deviations (SD). Categorical variables were expressed as frequencies and percentages. Data were entered into the PAM-13 online score sheet to obtain the activation score (1–100) and activation level (1–4) for each patient.²⁶ Higher PAM scores indicate higher patient activation levels.^{4,12} Data quality was examined using the mean ($\pm$ SD), percentage of missing data, and percentage of “non-applicable” answers for each item. Those who answered “strongly agree” or “strongly disagree” to all the items and those who answered ≥ 3 “non-applicable” answers were excluded from the analysis as these are the requirements to be able to compute a valid PAM-score as stipulated by Insignia Health.²⁶

Psychometric analysis of the PAM-13 Malay version was performed in three stages. First, to ensure that the items were suitable for principal component analysis (PCA), sampling adequacy using the Kaiser–Meyer–Olkin (KMO) criterion was performed before factor extraction. A KMO criterion of >0.5 was set as the minimum value for factor analysis, and >0.8 was considered optimal.³² The appropriateness of the data was assessed using Bartlett's test of sphericity. A p-value of <0.05 was considered appropriate to proceed with factor analysis.³²

Second, PCA for factor extraction with subsequent varimax rotation was chosen to examine the PAM-13 Malay version's dimensionality and construct validity.³³ Factor loadings of >0.30 were set as the lower cutoff point in the formation of the factor structure.³⁰ The eigenvalues, scree plot, and Monte Carlo PCA simulation were used to determine how many factors to retain.³³ The Kaiser's criterion suggests retaining factors with an eigenvalue of ≥ 1 .³⁴ Factors with a low eigenvalue of <1 were considered redundant as it would not explain much of the variance in the data. According to the scree plot, the number of factors to be retained are the data points above the point of inflection (i.e., the elbow).³³ Next, the Monte Carlo PCA for parallel analysis was also performed to further confirm the number of factors to retain.³⁵

Third, the internal reliability of the PAM-13 Malay version was measured using Cronbach's α coefficient and corrected item-total correlations. A Cronbach's α value of >0.70 is considered reliable.³⁶ The corrected item-total correlations are the correlations between individual items to the sum scale of the questionnaire. Correlations of $r \geq 0.10$ are considered as weak, $r \geq 0.30$ as moderate, and $r \geq 0.50$ as strong.³⁷ Intraclass correlation coefficients (ICC) were used to assess the test-retest reliability of the questionnaire. The closer the values are to 1.00, the more stable the items are over time.³⁸

Ethical consideration

Ethical approval was obtained from the Research Ethics Committee of Universiti Teknologi MARA [600-IRMI (5/1/6)/REC/61/19] prior to the conduct of the study. A research license was obtained from Insignia Health, University of Oregon²⁶ to validate and utilize the PAM-13 Malay version for research and educational purposes (License Number 1539265175-1570801175).

Results

The content and face validation of the PAM-13 Malay version

Regarding content validity, the expert panel found that the items were relevant to the construct being measured. CVI was found to be 1 for each item, and therefore, all 13 items were retained. For face validation, all 10

participants thought that the questionnaire was generally clear, easy to read, and understand. Several participants gave feedback on item numbers 1, 5, 6, 7, 8, and 13 regarding the wording for better clarity. These items were then refined for simpler and better understanding. These did not change the purpose and meaning of the items. The scale was straightforward, and participants managed to complete the questionnaire within 10–15 minutes.

Recruitment for field testing

Out of 145 patients who were approached and invited into the study, 132 (91.0%) fulfilled the eligibility criteria and were recruited into the study. Informed written consent was obtained, and these patients completed the self-administered PAM-13 Malay version. However, two participants were excluded from the analysis as they answered "totally agree" to all items. Therefore, the total number of participants included in the final analysis was 130 (89.7%).

Demographic characteristics

The demographic characteristics of the participants are shown in **Table 2**. The mean age was 60.4 years ($SD \pm 9.56$). More than half of the participants were female (53.8%), and the majority of them were Malays (82.3%).

Psychometric properties

Regarding the data quality, there were no missing responses to the questionnaire items. None of the participants answered "non-applicable" in ≥ 3 of the questionnaire items or "strongly disagree" in all items. Two participants answered "strongly agree" to all items, and they were excluded from the final analysis as this is a requirement to be able to compute a valid PAM-score.²⁶ The mean score was 58.9 ($SD \pm 9.9$). Overall, these findings confirmed that the dataset was of good quality.

The KMO value for the PAM-13 Malay version was 0.767, and Bartlett's test of sphericity was significant with a p-value of <0.001 , indicating that the sample was adequate for factor analysis. The highest value for communalities was 0.737 (item 2), and the lowest value was 0.243 (item 6). This indicates that 73.7% of its variability was explained by item 2.

Table 2. Socio-demographic characteristics of the participants (n = 130).

Variables	Frequency, n (%)	Mean (±SD)
All subjects	130 (100)	
Age		
18–39	6 (4.6)	60.4 (±9.56)
40–59	42 (32.3)	
60–80	82 (63.1)	
Gender		
Male	60 (46.2)	
Female	70 (53.8)	
Ethnicity		
Malay	107 (82.3)	
Chinese	13 (10.0)	
Indian	8 (6.2)	
Other	2 (1.5)	
Marital Status		
Single	4 (3.1)	
Married	115 (88.5)	
Divorced	3 (2.3)	
Widow / Widower	8 (6.2)	
Educational Level		
No formal education	2 (1.5)	
Primary	19 (14.6)	
Secondary	51 (39.1)	
Tertiary	58 (44.6)	
Occupation		
Unemployed	21 (16.2)	
Employed	38 (29.2)	
Pensioner	71 (54.6)	
Household Income		
B 40 ≤ RM 3,000	54 (41.5)	
M 40: RM 3,001–RM 13,147	71 (54.5)	
T 20: ≥ RM 13,148	5 (3.8)	

The PCA using varimax rotation yielded a three-factor solution, with eigenvalues of more than one. This three-factor solution explained a cumulative 53.7% of the variance in the data. Further analysis using the scree plot was conducted to aid in the decision of the number of factors to retain. The elbow of the scree plot occurred at factor three, suggesting that two factors should be retained. Since the PCA yielded a three-factor solution, and the scree plot suggested a two-factor solution, Monte Carlo PCA for parallel analysis was conducted. The Monte Carlo PCA supported the retention of a two-factor solution.³⁵ Therefore, a two-factor solution with varimax rotation was deemed to be the most conceptually appropriate for the PAM-13 Malay version. The data were reanalyzed by fixing the number of factors at two. The eigenvalue for Factor 1 was 2.04, with a variance of 15.7%, while the eigenvalue value for Factor 2 was 3.87, which explained 29.7% of the variance

in the data. The total variance for both factors was 45.4%.

Table 3 shows the results of the factor loadings of the PAM-13 Malay version on the final two-factor solution. All the items have factor loadings of >0.3 . Item 6 cross-loaded into both factors with the values of 0.356 and 0.334, and item 10 cross-loaded into both factors with the values of 0.490 and 0.399. Both items were retained in Factor 2 as they fit better conceptually in this factor. As previously shown in Table 1, PAM-13 consisted of 4 levels of activation. Our factor analysis supported a two-factor solution; therefore, Factor 1, which consisted of items 1–4, was labeled as “Passive and Building Knowledge,” in keeping with PAM-13 activation Levels 1 and 2. Factor 2, which consisted of items 5–13, was labeled as “Taking Action and Maintaining Behavior,” in keeping with PAM-13 activation Levels 3 and 4.

Table 3. Factor loadings on the final two-factor solution.

Item	Activation Level	Factor 1	Factor 2
PAM 1: I am the person who is responsible for taking care of my health	1	0.781	
PAM 2: Taking an active role in my own health care is the most important thing that affects my health	1	0.840	
PAM 3: I am confident I can help prevent or reduce problems associated with my health	2	0.768	
PAM 4: I know what each of my prescribed medications does	2	0.549	
PAM 5: I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself	2		0.585
PAM 6: I am confident that I can tell a doctor or nurse concerns I have even when he or she does not ask	2	0.356	0.334
PAM 7: I am confident that I can carry out medical treatments I may need to do at home	2		0.614
PAM 8: I understand my health problems and what causes them	2		0.477
PAM 9: I know what treatments are available for my health problem	3		0.633
PAM 10: I have been able to maintain lifestyle changes, like healthy eating or exercising	3	0.490	0.399
PAM 11: I know how to prevent problems with my health	3		0.668
PAM 12: I am confident I can work out solutions when new problems arise with my health	4		0.667
PAM 13: I am confident that I can maintain lifestyle changes, like healthy eating and exercising, even during times of stress	4		0.656

Extraction method: PCA with varimax rotation and Kaiser normalization.

Table 4 shows the item-total reliability analysis for the PAM-13 Malay version. The corrected item-total correlations ranged from 0.31 to 0.52, indicating moderate to strong correlations of the individual items to the sum scale of the questionnaire. The overall Cronbach's α value was 0.79. This value did not increase if any of the items were deleted.

Table 4. Item-total statistics for the PAM-13 Malay version.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's α if Item Deleted
PAM 1	24.71	13.67	0.36	0.44	0.77
PAM 2	24.72	13.83	0.33	0.54	0.78
PAM 3	24.93	13.38	0.48	0.49	0.76
PAM 4	24.95	13.48	0.44	0.29	0.77
PAM 5	25.26	12.66	0.46	0.34	0.76
PAM 6	25.07	13.68	0.31	0.19	0.78
PAM 7	25.68	13.34	0.31	0.25	0.78
PAM 8	25.06	13.25	0.44	0.29	0.77
PAM 9	25.23	13.03	0.44	0.29	0.77
PAM 10	25.09	13.59	0.45	0.37	0.77
PAM 11	25.28	13.13	0.52	0.40	0.76
PAM 12	25.71	13.23	0.39	0.42	0.77
PAM 13	25.28	13.18	0.47	0.40	0.76
Overall Cronbach's α value					0.79

Table 5 shows the Cronbach's α value for each domain of the questionnaire. For Factor 1, the Cronbach's α value was 0.76, whereas for Factor 2 was 0.77. This indicates the questionnaire items within these two domains were reliable.

Table 5. Cronbach's α values of the PAM-13 Malay version.

Domain	Item	Cronbach's α
Passive and Building Knowledge	PAM 1–PAM 4	0.76
Taking Action and Maintaining Behavior	PAM 5–PAM 13	0.77

Table 6 shows the ICC value for each item in the PAM-13 and the overall value. Most of the items have fair to good reproducibility. The overall ICC value was 0.45, which indicates that the PAM-13 Malay version was fairly stable over time.

Table 6. Intraclass correlation coefficient values of the PAM-13 Malay version.

Item ICC	ICC (95% CI)
PAM 1: I am the person who is responsible for taking care of my health	0.30 (0.01–0.61)
PAM 2: Taking an active role in my own health care is the most important thing that affects my health	0.55 (0.23–0.77)
PAM 3: I am confident I can help prevent or reduce problems associated with my health	0.41 (0.05–0.68)
PAM 4: I know what each of my prescribed medications does	0.59 (0.28–0.79)
PAM 5: I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself	0.47 (0.12–0.72)
PAM 6: I am confident that I can tell a doctor or nurse concerns I have even when he or she does not ask	0.46 (0.10–0.71)
PAM 7: I am confident that I can carry out medical treatments I may need to do at home	0.41 (0.05–0.68)
PAM 8: I understand my health problems and what causes them	0.59 (0.28–0.79)
PAM 9: I know what treatments are available for my health problem	0.26 (0.12–0.58)
PAM 10: I have been able to maintain lifestyle changes, like healthy eating or exercising	0.41 (0.05–0.68)
PAM 11: I know how to prevent problems with my health	0.44 (0.08–0.70)
PAM 12: I am confident I can work out solutions when new problems arise with my health	0.55 (0.22–0.77)
PAM 13: I am confident that I can maintain lifestyle changes, like healthy eating and exercising, even during times of stress	0.45 (0.09–0.71)
Overall	0.45

Discussion

PAM-13 has consistently been shown to have strong psychometric properties in numerous validation studies involving heterogeneous groups of patients with various chronic conditions worldwide.^{17–25,39} This tool has been proven to be valid and reliable for assessing patients' knowledge, skills, and confidence in self-management of chronic conditions. Our study was the first validation study of the PAM-13 Malay version carried out in a primary care clinic among patients with MetS in Malaysia.

The data quality of our study was good, as there were no missing values. The mean score of the

PAM-13 Malay version among patients with MetS was 58.9 (SD $\pm$ 9.9). This is comparable to the mean activation score of 58.6 (SD $\pm$ 10.8) among patients seen in a heart clinic in Singapore.⁴⁰ Comparatively, the mean activation scores were lower at 50.0 (SD $\pm$ 13.5) among patients with osteoarthritis in Korea²⁵ and also among patients with mental health in Norway, where the mean activation score was 51.9 (SD $\pm$ 14.2).²⁴ However, the mean activation score was found to be higher at 68.3 (SD $\pm$ 14.8) among primary care populations in Germany.²⁰

In the original American version, the PAM-13 items were conceptually developed to represent four domains, that is, knowledge, beliefs,

confidence, and skills about managing one's health. These domains reflect four levels of activation,^{4,12,13} as shown above in Table 1. The PCA in our study identified a two-factor solution, explaining 45.4% of the variance. Conceptually, these factors were thought to represent a combination of two domains from the original four levels of activation. Factor 1 was labeled as "Passive and Building Knowledge" as it consisted of items 1-4, in keeping with PAM-13 activation Levels 1 and 2. Factor 2 was labeled as "Taking Action and Maintaining Behavior" as it consisted of items 5-13, in keeping with PAM-13 activation Levels 3 and 4. These labels were chosen as they were conceptually consistent with the items representing the levels of activation in PAM-13.

The finding of our study is comparable to the validation study of PAM-13 among patients with mental health in Norway, where the PCA revealed a fit for a two-factor model, explaining 48.07% of the variance.²⁴ Apart from our study and the Norwegian study, this bi-factorial solution has not been identified in previous research. In contrast to our findings, a study conducted among primary care patients in Germany showed that PCA with a subsequent varimax rotation revealed only one major underlying factor, explaining 34.5% of the variance.²⁰ In a study among patients with diabetes, hypertension, or rheumatoid arthritis in Turkey, confirmatory factor analysis (CFA) also confirmed the one-factor structure.⁴¹ When Rasch analysis was used, the majority of the studies also revealed the unidimensionality of PAM 13. These include the original 22-item American version of PAM,⁴ the PAM-13 Danish version among patients with dysglycemia,¹⁹ the Italian version among patients with chronic conditions,²³ and the Korean version among patients with osteoarthritis.²⁵ Other previous studies that used the Rasch model have also supported the unidimensionality of the scale.^{18,39} However, a more recent study using the Rasch model in Sweden found that the evidence for unidimensionality was ambiguous.⁴² Differences in the sample population of our study, for instance, comorbidities, multi-ethnicity, and cultural backgrounds, may have resulted in the different factor structure. However, a definitive conclusion about the factor structure can only be made using CFA. Therefore, future studies using CFA among patients with MetS in Malaysia should be conducted to clarify this issue.

Regarding internal consistency, our study has proven that the PAM-13 Malay version is reliable, with a Cronbach's α value of 0.79. This is comparable to the Hebrew translation with a Cronbach's α of 0.77,²² the German version with a Cronbach's α of 0.84,²⁰ the Korean version with a Cronbach's α of 0.88,²⁵ and the Dutch version with a Cronbach's α of 0.88.²¹

Regarding the test-retest reliability analysis, our study revealed an overall ICC value of 0.45 and ranged from 0.26 to 0.59, indicating that the PAM-13 Malay version was fairly stable over time. This finding is comparable to the Dutch version, where the value was 0.47 with a range of 0.25 to 0.49,²¹ and the Brazilian version, which found a range of 0.26 to 0.59.⁴³

Strengths and limitations

The strengths of this study include a high response rate of 91%. The data quality is good, as there were no missing values. Only two participants had to be excluded from the final analysis as they answered "strongly agree" to all items. This study, however, has several limitations. First, although the sample to variable ratio of 10:1 was adequate for factor analysis in this study, a larger sample size of at least 300 participants would diminish the error in the data.³³

Second, this study was conducted in a single primary care clinic where the majority of the participants were Malays (82.3%). Therefore, the findings may not be generalizable to other primary care clinics in Malaysia with a multiethnic population, as the Chinese and Indian ethnic groups were underrepresented in our study. Third, a convenience sampling method used in this study may contribute to sampling bias. However, a systematic random sampling method was not feasible for this study due to the absence of an electronic registry for patients with MetS in our primary care clinic. In the absence of a registry, it would be difficult to conduct systematic random sampling to ensure that all eligible patients within the sampling frame were given an equal chance to be selected for the study. However, measures were taken to reduce the sampling bias by ensuring that all patients who attended the clinics on the data collection days were approached and invited to participate. Lastly, CFA and Rasch Model analysis to assess the scale properties

could not be conducted due to the need for a larger sample size and the limited time frame given to complete the study. Concurrent or convergent and divergent validities were also beyond the scope of this study as the terms and conditions of the research license agreement provided by Insignia Health²⁶ do not include validating the PAM-13 Malay version against a new or existing patient health engagement, motivation, activation, self-management, or similar assessment or predictive modeling tool.

Implications for further research and clinical practice

Our study has produced a valid and reliable PAM-13 Malay version, which can be used to measure knowledge, skills, and confidence in self-management among patients with MetS in primary care in Malaysia. However, the questionnaire is only useful to those who can read and understand the Malay language. Translations of this questionnaire into Mandarin and Tamil are recommended to cater to the needs of other major ethnic groups in Malaysia, that is, Chinese and Indians. Further research involving a larger sample size and systematic random sampling to represent major ethnic groups in Malaysia is also recommended to further validate this questionnaire. CFA and Rasch Model analysis should also be conducted to further evaluate the PAM-13 Malay version's scale properties. Additional studies are also needed to validate the PAM-13 Malay version in other settings, for example, secondary care, or in patients with other chronic conditions such as mental health concerns.

Conclusion

The PAM-13 Malay version has been shown to be valid, reliable, and fairly stable over time. This tool can be used to measure activation levels among patients with MetS in the primary care setting in Malaysia. However, a further validation study, which includes CFA, is recommended to strengthen the validity of the PAM-13 Malay version. Further research to measure patient activation levels is also needed. Intervention strategies can then be developed and targeted, particularly toward those with low activation levels. These patients need to be empowered to improve their knowledge, skills, and confidence to self-manage their chronic conditions and eventually improve outcomes.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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How does this paper make a difference to general practice?

- This is the first validation study of the PAM-13 Malay version carried out in a primary care clinic among patients with metabolic syndrome in Malaysia.
- The PAM-13 Malay version has been shown to be valid, reliable, and fairly stable over time.
- This questionnaire can be used to evaluate the levels of activation among patients with metabolic syndrome in primary care in Malaysia.
- Intervention strategies can then be developed and targeted, particularly toward those with low activation levels.
- These patients need to be empowered to improve their knowledge, skills, and confidence to self-manage their chronic conditions and eventually improve outcomes.

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Patient perception of pre-pregnancy care and family planning among reproductive-age female diabetes mellitus patients in a primary care clinic in Penang, Malaysia

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Abstract

Introduction: Pre-pregnancy care (PPC) is an important part of diabetic care among females in the reproductive age group, as it improves fetomaternal outcomes.

Objective: We aimed to assess female diabetic patients' perception of PPC and family planning prior to PPC care.

Method: This was an observational, cross-sectional survey performed from June 2019 to September 2019, using universal sampling of registered female diabetic patients who fit the inclusion criteria prior to integrated PPC care. A self-administered questionnaire was used to assess patients' perception of PPC.

Results: A total of 67 patients were recruited for the study. Only 39.4% (n=26) of the patients had heard of PPC. In our study, Code 1 contraception included those methods with a Pearl index of ≤ 9 . Code 2 & 3 contraception included those methods with a Pearl index of > 9 . Only one-third of patients, 29.9% (n=20), were using Code 1 contraception, although the majority, 79.1% (n=53), felt that they had completed their family. 45 patients (68.2%) felt that they were at risk of developing complications if they were to become pregnant, and 46 patients (69.7%) felt that their health condition was not suitable for another pregnancy. However, only 31.1% (n=14) and 34.8% (n=16) of these patients were using Code 1 contraception, respectively. There were 30 patients (65.2%) who perceived that their health was not suitable for another pregnancy but were only using Code 2 or 3 contraception.

Conclusion: The patients' perception of PPC was poor. Patients had an inadequate knowledge of the effectiveness of their current contraceptive practice in relation to their intentions for further pregnancy and their self-perceived risk in case of future conception. We suggest that integration of PPC into routine follow-ups for other high-risk medical diseases, such as hypertension, heart disease, and epilepsy, be considered in future practice.

Introduction

Preconception care (PPC) is an important interventional approach to improve pregnancy outcomes and the health of future children through identification and modification of biomedical, behavioral and social risk to the mother's health. Based on systemic review and metanalysis, PPC among female diabetic patients has been shown to improve outcome (e.g., to reduce the rates of congenital malformation and of preterm delivery).¹ In Malaysia, Diabetes Mellitus (DM) is one of the commonest medical conditions affecting pregnancy², and is associated with adverse fetal, infant, and maternal outcomes.^{3,4} A Malaysian study has shown that DM is increasingly prevalent among females (9.1%)², and that only 23.8% of diabetic patients achieve a treatment target

of HbA1c $< 6.5\%$.² Taking this into account, a significant number of female DM patients in the reproductive age group will conceive in unplanned, suboptimal conditions.^{5,6} Thus, good preconception care prior to conception, coupled with the provision of effective contraception during the optimization of glycemic control, is a very important part of diabetic care for females of reproductive age.^{3,4}

To achieve good PPC care in Malaysia, the Malaysian Ministry of Health (MOH) has created several initiatives, such as integrating PPC care in maternal and child health clinics (MCHs) and outpatient departments (OPDs), and aiming to coordinate patient care for high-risk patients between primary health care clinics and tertiary hospitals.^{7,8} The MOH also provides cheap, affordable and easily

available contraceptive services in their MCHs. Unfortunately, despite efforts to promote contraceptive use in Malaysia, use has remained stagnant for 25 years,⁹ and the use of effective contraception among high-risk female patient stalled at only 38-54%.⁷ These figures are very low compared to neighboring countries (e.g., Thailand, at 72%).^{7,9} Based on qualitative studies performed locally and abroad, it appears that the reasons behind the low contraception adoption levels are multifactorial, encompassing not only factors involving not only the patient (knowledge, attitude, practice and sociocultural background) but also the healthcare provider and healthcare system.¹⁰⁻¹²

In order to further integrate and improve PPC care in our local setting, we set out to explore female DM patients' perception of their own need for contraception in relation to PPC, and also to design a new protocol to improve PPC care plans among our DM female patients of reproductive age. We developed an integrated system to ensure the continuity of PPC care from postnatal (MCH) to DM (OPD) follow up. We hope that with this integrated PPC care, the data collected from this study will provide health care providers (HCPs) insight into female DM patients' practice and perception of family planning and PPC.

Material and methods

Ethical approval for conducting this study was obtained from the Medical Research and Ethics Committee, Malaysian Ministry of Health (NMRR-18-3488-45517 (IIR)).

Study design & objective:

This was an observational, cross-sectional survey conducted from June 2019 to September 2019 among female patients with Type 2 Diabetes Mellitus in the reproductive age group who attended Jalan Perak Health Clinic in Penang, Malaysia. The study aims to assess patients' perception of PPC and family planning prior to PPC care being given. Our specific objectives were to determine the prevalence of the types of contraceptive method used by patients; and to determine patients' self-perception of their pregnancy risk, the effectiveness of the current contraceptive methods used, and the risks from unplanned pregnancy versus the risks of side effects from using contraception.

Definition:

Code 1 contraception was defined as

contraception with a Pearl index of ≤ 9 (e.g., sterilization, intrauterine device (IUD), Implanon, oral contraceptive pills (OCP)). Code 2 contraception was defined as contraception with a Pearl index of 10-32 (e.g., male condom or cervical cap). Code 3 contraception was defined as contraception with a Pearl index of ≥ 25 (e.g., calendar-rhythm method, lactation amenorrhea method or withdrawal method).⁷ Code 1 contraceptive methods were categorized as effective contraception, while Code 2 & 3 contraceptive methods were classified as less effective contraception.

The reproductive age group in our study was defined as age 18 to 45 years old, as, based on our local clinic data, there has been no pregnancy at advanced maternal age--above 45 years--for the past 2 years (2017-2018).

"Not sexually active" in our study was defined as a patient who stated, during data collection, not having had any form of sexual intercourse for the past one year.

"Active follow-up" in our study meant that the patient was regularly seen under our follow-up for Diabetes Mellitus care for the past one year during the data collection.

Inclusion and exclusion criteria:

The inclusion criteria included: all females with Diabetes Mellitus in the reproductive age group who were actively followed up in the clinic, based on the database we created.

The exclusion criteria excluded patients who: were not sexually active, had previously been sterilized, were menopausal, were not in active follow-up, or were unable to understand the questionnaire for any reason (e.g., mental retardation).

Sample size:

Using a universal sampling method, a total of 127 female DM patients who fit the inclusion criteria were identified during our study period. 50 patients were excluded based on the exclusion criteria. A total of 77 patients who fit our inclusion criteria were approached, of whom 71 consented to take part in the study. In our final analysis, 4 further cases were excluded in the final stage of data analysis due to missing data in the questionnaire (patients were not called back for completion of the questionnaire, as

their answers would have been biased after PPC counseling had been given). Thus, our final data set consisted of 67 patients.

Sampling method:

Prior to the study, a complete registration and database system for our diabetic patients was created, using Excel and bar-code identification. A universal sampling method was used. A PPC data collection sheet and a self-administered survey questionnaire were pre-inserted into the selected patients' DM record books, based on the data base. This was to help remind the healthcare providers (HCPs) to initiate PPC for those who were sexually active, regardless of their marital status. They were to be tagged, and continuous PPC to be provided in subsequent visits during their DM follow-ups.

Relevant information was collected by the treating doctor, using the Data Collection Sheet, after consent was obtained during the patients' routine DM follow-up sessions from 01/06/2019 to 30/9/2019. After data collection, PPC counseling was given to patients in the same clinic setting by the treating doctor. A one-hour presentation on how to counsel for PPC was given to all of our HCPs, prior to the initiation of our integrated PPC system, to ensure competency in managing this group of patients. Cases that need further attention will be referred to Family Medicine Specialists (FMS), as they play an important role in improving collaboration and the integration of PPC in primary care as well as with tertiary hospitals.

Questionnaire development:

A self-administered survey questionnaire (available in three languages: English, Malay, and Mandarin) was used. It required about 10 minutes to complete. The questionnaire included 4 domains:

- i) the patient's perception of pre-pregnancy care (8 questions, items 1 to 8); ii) the patient's sociodemographic background; iii) the patient's marital status and the family planning method(s) used; iv) the patient's medical data. The information

for sociodemographic background, marital status, family planning and medical data were taken from the patients' diabetes follow-up records and their PPC form.

To assess patients' perceptions, patients were required to answer "Yes," "No," or "Unsure" for each item. Answering "Yes" would mean a positive perception in all items except Item 3, in which a "No" answer was deemed a positive perception.

The questionnaire had face and content validation performed by one senior Family Medicine Specialist (FMS). Back-to-back translation was performed by two translators who were fluent in the 3 languages used in the questionnaire. A pilot test was performed with 12 patients (4 patients per language). The questionnaire was then finalized, with changes to make the sentences more understandable in laymen's terms. Reliability testing for perception of the questionnaire (Items 1 to 8) was performed, and the Cronbach alpha was 0.62.

Data analysis:

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS), Version 23. Descriptive analysis was used for variable analysis. Categorical data was described as frequency and percentage, while numerical data was described as median and interquartile range (IQR), as they were found to be non-normally distributed. The section on perception was analyzed descriptively, as validation was deemed inadequate.

Results

The demographic characteristics of patients are presented in **Table 1**. The patients' median age was 42 years old (IQR: 37-44) and their median HbA1C was 7.5% (IQR: 6.55-9.40). About half were Malay (55.2%), 26.9% were Chinese, 13.4% were Indian and 4.5% were of other races. The majority were married (98.5%), while 1.5% were single. Almost all the patients (91%, n=61) had DM-related complications or other comorbidities.

Table 1. Patient demographic data (total n=67)

Variables	Median (IQR)*	n (%)
Age (years)	42	(37-44)
Last Childbirth (years)	8	(0.79-14)
HbA1c (%)	7.5	(6.55-9.40)
Race		
Malay		37 (55.2)
Chinese		18 (26.9)
Indian		9 (13.4)
Other		3 (4.5)
Religion		
Muslim		38 (56.7)
Buddhist		17 (25.4)
Hindu		9 (13.4)
Christian		2 (3.0)
Others		1 (1.5)
Marital status		
Single		1 (1.5)
Married		66 (98.5)
Contraception method		
Code 1 contraception		20 (29.9)
Code 2 contraception		20 (29.9)
Code 3 contraception		27 (40.3)
Completed family?		
Yes		53 (79.1)
No		14 (20.9)
Diabetic status		
Diabetic		6 (9.0)
Diabetic with comorbidities		54 (80.6)
Diabetic with TOD/TOC**		7 (10.4)
Education		
Primary School		11 (16.4)
High School		45 (67.2)
Tertiary education		11 (16.4)

*IQR = interquartile range, **TOD/TOC = target organ damage / target organ complications

Patients' knowledge and perception of PPC and family planning are presented in **Table 2**. It was noted that patients' knowledge of PPC was poor. Only 38.8% (n=26) of the patients had heard of PPC.

Table 2: Patients' knowledge and perception of PPC and family planning (total n=67)

Item	Answer		
	No,n (%)	Unsure,n (%)	Yes,n (%)
1. Have you heard of pre-pregnancy care service?	30 (44.8)	11 (16.4)	26 (38.8)
2. Have you heard of family planning?	14 (20.9)	5 (7.5)	48 (71.6)
3. Do you think your current health condition is suitable for next pregnancy?	46 (68.7)	20 (29.9)	1 (1.5)
4. Do you think planned pregnancy have a better outcome for mother and baby?	10 (14.9)	14 (20.9)	43 (64.2)
5. If you are pregnant, do you think you are at risk of developing complication during pregnancy?	6 (9.0)	15 (22.4)	46 (68.7)
6. Do you think the current contraception method you are using is efficient in preventing pregnancy?	10 (14.9)	18 (26.9)	39 (58.2)
7. Do you think that, in patients with medical illness, the risk of using hormonal (eg. contraceptive pill, implanon) /mechanical (eg.condom, IUCD) contraception is lower than the risk of unplanned pregnancy ?	10 (14.9)	32 (47.8)	25 (37.3)
8. Do you think that hormonal or mechanical method of contraception is more effective in family planning compare to natural method (eg. withdrawal, menstrual calendar)?	11 (16.4)	36 (53.7)	20 (29.9)

Further analysis of the data revealed a discrepancy regarding the effectiveness of the current contraceptive methods being practiced by patients, in relation to their intentions regarding further pregnancy. Among the 53 patients who felt that they had completed their family, only a third (34%, n=18) of the patients were using Code 1 contraception (Table 3). Further examination of those who thought that their current method of contraception was effective (n= 39) revealed that only 46.2% (n=18) were using Code 1 contraception (Table 3). Less than a third of the patients (29.9 %, n=20) thought that Codes 1 and 2 contraceptive methods were more effective in family planning, compared to Code 3 contraceptive methods (Table 2, Item 8).

There was also a worrying discrepancy between the contraceptive practices being used by patients, in relation to patients' self-perceived risk regarding, or suitability for, conception and pregnancy. Among the 67 patients, about two-thirds (68.7%) felt that they were not medically healthy enough for pregnancy (Table 2). However, of those who thought that they would be at risk of developing complications during pregnancy and those who thought their health condition was unsuitable for another pregnancy, only 30.4% (n=14) and 34.8% (n=16) of the patients, respectively, were using Code 1 contraception (Table 3).

Table 3: Patient knowledge of contraception and their contraceptive practices

	Code 1	Code 2 or Code 3
Has completed family (n = 53)	18 (34%)	35 (66%)
Thinks current contraception is effective (n=39)	18 (46.2%)	21 (53.8%)
Thinks self not medically suitable for pregnancy (n=46)	16 (34.8%)	30 (65.2%)
Thinks self at risk of developing complications during pregnancy (n= 46)	14 (30.4%)	32 (69.6%)

Our study showed that there was a knowledge gap in patients' perceived effectiveness of their current contraception, in relation to their perceived risk of their own suitability for conception (Table 4). Of the 32 patients who perceived that they were at risk of developing complications during pregnancy, but were only using Code 2 or Code 3 contraception, 14 patients (43.8%) were of the opinion that their current contraception were effective, 6 patients (18.7%) thought that their current contraception was ineffective, and 12 patients (37.5%) were unsure of the effectiveness of their contraceptive methods. Almost the same finding was noted for the 30 patients who perceived their health as being unsuitable for another pregnancy but were only using Code 2 or Code 3 contraception. Almost half

of these (53.3%, n=16) thought that their current contraception method was effective, and only 20% (n= 6) felt their contraception method was not effective, while 26.7 % (n=8) were unsure of the effectiveness of their contraceptive methods.

Table 4. Patients' perception of their own health risk and of the effectiveness of their contraceptive practice

	Perceives current contraception method used to be effective	Unsure of the effectiveness of current contraception method used	Perceives current contraception method used not to be effective
Patient perceived that they were at risk of developing complications during pregnancy, but was only using Code 2 or 3 contraception (n=32)	14 (43.8%)	12 (37.5%)	6 (18.7%)
Patient perceived that health was not suitable for another pregnancy, but was only using Code 2 or 3 contraception (n=30)	16 (53.3%)	8 (26.7%)	6 (20%)

Discussion

Our study shows that most patients were aware of family planning, but had not known about PPC services. This could be because most of our patients had already completed their family (mean age 42 years, LCB 8 years) and were using some form of contraception for family planning, and hence were no longer interested in pre-pregnancy care services. The result was low compared to another study performed locally,¹³ where awareness of PPC was much higher at 82%. It was noted that the patient population in that study had a mean age of 32 years, which falls into a group that is more likely to bear further children and ergo need PPC services. Therefore, health care providers (HCPs) should be aware of patients' specific reproductive needs when engaging patients about the necessity of PPC.^{12,14}

We also noted that there was also an incorrect perception of the effectiveness of patients' current contraceptive practices in relation to the patients' intentions for further pregnancy and their self-perceived risk for future conception. This was similar to other findings from studies performed locally and abroad.¹³⁻¹⁶ Due to limitations in our questionnaire, multivariate analysis was not carried out in our study; however, review of other studies performed locally showed that more positive perception, greater knowledge and higher education level are associated with a greater chance of patients using PPC care services.¹³ Thus, poor perception coupled with

poor knowledge is likely to lead to a higher chance of patients having unplanned, high-risk pregnancies and lower PPC use, and should be addressed during PPC care.

Our study also showed a gap in perceived effectiveness of current contraception practice relative to the contraceptive methods that patients were actually using. We found that some patients assumed the contraceptive methods they were using (Codes 2 and 3) were effective in preventing pregnancy, when, in fact, they should consider using more effective Code 1 contraception. We also found that about 70% of patients perceived Code 1 contraception as not being better than Code 2 or 3 contraceptive methods. 62.7% of patients also deemed that the risks of unplanned pregnancy were lower than the risks of side effects from using Code 1 contraception. Such gaps in perception have not been previously elicited in other studies, and shed some light on the reasons behind poor PPC uptake and, perhaps, the high prevalence of unplanned pregnancy in our country.^{7,9}

In terms of managing high-risk patients, a qualitative study by Forde et al (2016) showed that HCPs and health care systems (HCSs) also play important roles in the utility of PPC in the primary-care setting (10). HCPs and HCSs should facilitate an integrated PPC in their routine DM care, in order to improve health outcomes for their female DM patients. We suggest creating a complete database of actively followed-up DM patients, and targeting all

female DM patients of reproductive age for further explanation and planning regarding PPC.

The limitations in our study were that it was single-centered, with an older-age-group population, and we explored only a single disease (DM). Thus, our study may not be fully representative of the general population. Our questionnaire did not achieve good validation and we were unable to proceed further with multivariate analysis. Despite these limitations, our study highlighted areas of gaps in perception among patients. This may help HCPs to understand what to focus on during management of such patients, and could be the focus for future research on this topic. In term of management, a similar strategy could be used to create a database for other high-risk medical diseases such as hypertension, heart disease, epilepsy and others, where PPC can be integrated during follow-up for the medical condition in the primary-care setting. We believe that this should be considered in future practice.

Conclusion

In this study, we observed that the perception of PPC and knowledge regarding effective contraception were both poor among the women in our local setting. In order to improve PPC uptake and knowledge among female DM patients, we suggest that good integrated PPC care should encompass not only patient

education, but also healthcare provider education and healthcare system change as well. We also suggest that integration of PPC into routine follow-up care for other high-risk medical diseases, such as hypertension, heart disease, epilepsy, and others, be considered in future practice.

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Declaration of Interest

The authors declared no conflict of interest in this study.

Contribution to authorship

SNL and TWS designed the study and analyzed the data. SNL and EWS collected the data. SNL, TWS, EWS and RPP were involved in the write-up, and read and approved the final manuscript prior to submission.

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How does this paper make a difference to general practice?

- Improves understanding of patients' perception of pre-pregnancy care (PPC) in the local population
- Will assist in targeting and improving PPC counseling in general practice
- Suggests specific ways to improve PPC services in general practice
- Suggest a system to integrate PPC care into existing DM follow-ups

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Factors Influencing Malaysian Men's Perceptions of Gender Equity in Family Planning

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Abstract

Introduction: Various factors influence men's perceptions regarding gender equity in family planning (FP). Identifying these factors can contribute to a deeper understanding of the roles that men play in family planning and ultimately leads to women's reproductive health outcomes.

Objectives: This paper aims to investigate factors influencing Malaysian men's perceptions of gender equity in family planning. To achieve this, the effects of sociodemographic characteristics (age, education, and marital status), masculine traits, and attitudes towards domestic violence are investigated.

Methodology: This is a cross-sectional study undertaken by administering questionnaires to a sample of 168 men in Malaysia. The data are analyzed by applying partial least squares–structural equation modeling (PLS-SEM) and by using WarpPLS 6.0.

Results: The results confirmed the significant effects of masculine traits and attitudes supporting domestic violence on perceived gender equity in family planning. In other words, the results showed that men's masculine traits and attitudes supporting domestic violence negatively influenced gender equity in family planning. The hypothesized effects of sociodemographic characteristics on perceived gender equity in family planning could not be verified.

Conclusions: This study suggests some practical implications for local authorities to implement interventions that take a gender transformative approach to reduce men's masculine traits and improve their attitudes towards domestic violence to enhance gender equity in family planning.

Introduction

Despite the growing interest in men's studies, research concerning Malaysian men's perceptions of gender equity in family planning has not been adequately explored.¹ The United Nations Population Fund (UNFPA) has a good history of working with men and boys by applying a gender perspective in their health-related programs. From this perspective, understanding the roles of men and the influence of their gender attitudes are considered as important factors for family health outcomes.² The Program of Action of the International Conference on Population and Development (ICPD) stated that: "Men play a key role in bringing about gender equality since, in most societies, men exercise preponderant power in nearly every sphere of life, ranging from personal decisions regarding the size of families to the policy and program decisions taken at all levels of government".³ In light of this definition, gender equity in family planning, in this study, refers to including men in family planning and sharing contraceptive responsibility among partners.⁴

Several factors influence men's perceptions regarding gender equity in this area. Identifying these factors can contribute to a deeper understanding of the roles men play in family planning that lead to improvement in women's reproductive health outcomes.

Previous studies have investigated the effects of factors influencing men's participation and gender equity in family planning.^{5,6} Of the various theories applied in these studies, the dominant theory is the gender-relations approach.⁷ According to this, gender dynamics and other contextual factors are important elements that influence both the role men play and gender equity in family planning. This perspective suggests that a context should be provided in which men are integrated as responsible and supportive actors in family planning practices and as contraceptive users. Recent studies applying this perspective have shown that gender relations and attitudes are significant to family planning decisions and practices.^{8–10}

Several studies suggest that traditional masculine role expectations alone have

negative implications for close relationships.¹¹ For instance, Mosher (1991) found that highly masculine personality traits in men were positively associated with reports of their aggressive sexual behavior.¹² Pleck et al. (1993) define masculine personality traits as the degree to which a man possesses the characteristics expected in men. It is assessed by the masculinity subscales in measures such as the Sex Role Inventory (BSRI) developed by Bem in 1974.^{13,14} Many studies regard the predominant culture in society as central to whether there is adherence to masculine traits and inequitable gender norms.^{15,16} According to the literature, traditional patriarchal cultural values concerning masculinity, men's dominance over women and gender inequity put family planning and women's reproductive health in jeopardy.¹⁷ One form of culturally-specific masculinity that impacts family planning is the disapproval by husband of contraceptive use by their wives. In some studies conducted in developing societies, it was shown that if the husband does not approve the contraceptive use by his wife, the likelihood of contraceptive adoption is significantly reduced.¹⁸ There are different motivations behind this disapproval. For example, men who adhere to masculine norms may think that making a woman pregnant validates their masculinity¹⁹ or they may otherwise consider family planning and pregnancy prevention as being the woman's responsibility.²⁰ Studies show that men's adherence to masculine gender norms was a critical barrier in achieving gender equity in family planning and reproductive health. This leads to men's control over condom use, sexual decision-making, and male pleasure predominating in sexual encounters.^{21,22}

Several studies have documented negative associations between domestic violence and gender equity in family planning decisions and practices. Connell (2013) argues that domestic violence can in certain circumstances, be used by men to assert their manhood. However, this may lead to poor and risky reproductive outcomes for women such as sexual and reproductive coercion, unintended pregnancy and induced abortion.²⁴⁻²⁷

In addition to the above factors, some studies have demonstrated that socio-demographic characteristics such as age, education level, marital status, race and religion affect the attitudes of men towards gender equity in

family planning practices.^{28,29} For instance, research has shown that educated men may have progressive views concerning gender equality and may be aware of its importance^{30,31} and that this leads to a significant improvement in men's contraceptive use.^{32,33} Moreover, some studies have found that age influences the support of men for gender-equitable norms.³⁴ Younger men may have more modern and positive attitudes towards gender equity, men's participation in family planning and using modern contraceptives such as condoms.³⁵ The influence of religion on sexual and reproductive behaviors has long been recognized by social scientists. However, inconsistent results have been reported regarding the association between religiosity and contraceptive use.³⁶ For instance, Movahed and Tourajian (2007) found that Islamic religious values have a significant and positive effect on men's attitudes towards their participation in family planning.³⁷ In contrast, Charles (2014) in a study in Tanzania found the Islamic religion and its teaching and practices a significant hindering the use of contraceptives by men.³⁸ Such variation in results may be due to the variations in the interpretations of religion to concerning fertility control.

Despite increasing interest in these issues, there has been little research in the Malaysian context to understand how men's perceptions of gender influence family planning and the field remain undeveloped in the literature. This paper, therefore, aims to investigate factors influencing Malaysian men's perceptions of gender equity in family planning. To achieve this, the effects of men's age, education, marital status, masculine traits, and attitudes supporting domestic violence are investigated.

This study, for which the conceptual framework is set out in Figure 1, examines the following five hypotheses concerning family planning:

- H1:** Age has a significant effect on men's perceived gender equity in FP.
- H2:** Education has a significant effect on men's perceived gender equity in FP.
- H3:** Marital status has a significant effect on men's perceived gender equity in FP.
- H4:** Masculine traits has a significant effect on men's perceived gender equity in FP.
- H5:** Attitudes supporting domestic violence has a significant effect on men's perceived gender equity in FP.

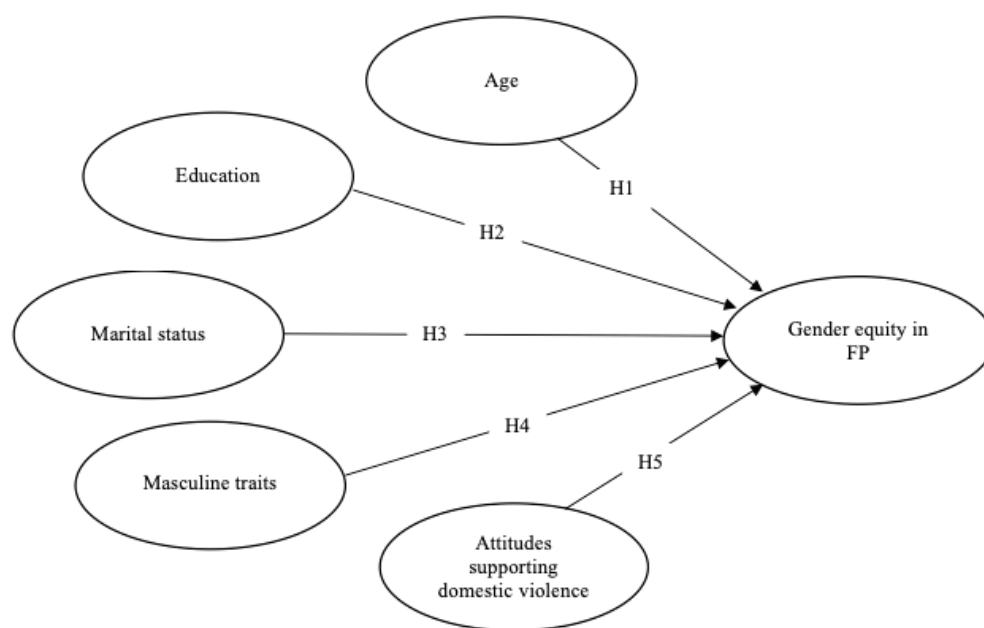


Figure 1. Conceptual framework

Methods

Research Instruments

In this study we applied a quantitative approach by using a questionnaire containing several items or question-statements adapted from instruments widely used in gender research as well as locally developed scales. The 20 items used to measure masculinity were adapted from the Bem Sex Role Inventory Scale (BSRI) on a 7-point Likert scale, which was created by Sandra Bem to measure an individual's identification with traditionally masculine and feminine personality traits.^{14,39}

Concerning attitudes supporting domestic violence, the seven statements used were adapted from a previous study conducted by the Centre for Research on Women and Gender (KANITA), at Universiti Sains Malaysia (USM).⁴⁰ Researchers there conducted the first extensive study to provide and prepare comparable data on the impact of gender-based violence against women on their general well-being. In their 2013 study, Shuib and her collaborators adapted and validated the questionnaire from the WHO's multi-country study on women's health and domestic violence against women.⁴¹ The items concerning attitudes to domestic violence were answered on a 7-point Likert scale, from 1 [strongly disagree] to 7 [strongly agree]. Higher scores on this construct indicate

greater support for domestic violence against women. In other words, men with higher scores on this construct tend to present higher levels of acceptability of this violence.

To measure perceived gender equity in family planning, we applied a version of the Gender-Equitable Men Scale (GEM) localized for the Malaysian context in 2013 by Sukumaran.⁴² The Malaysian version of the GEM scale contains twenty-one items of which seven items concern gender equity in family planning, on a 3-point Likert scale with possible responses of "disagree," "partially agree," and "agree." Higher scores on this scale indicate greater support for gender equity. The scales and related items used in the current study are set out in **Table 1**.

Before conducting the survey, we asked three academic experts to review and provide comments on the questionnaires. The questionnaires were administered in the Bahasa Malay language. We also conducted a pilot test with 100 male respondents to assess the reliability and validity in the questionnaire of the adapted and localized scales. The findings of this pilot study indicated that the questionnaire was valid and reliable.⁴³

Data Collection Process

The process of data collection began with identifying suitable respondents according to the inclusion criteria. This study recruited only

Table 1. Instrument measures and related items

Scale	Subscale	Items
Bem Sex Role Inventory (BSRI)	Masculine Traits (MT)	Self-reliant Independent Assertive Self-sufficient Masculine Aggressive Competitive Willing to take risks Has a strong personality Make decisions easily Defends own beliefs Athletic Forceful Dominant Acts as a leader Individualistic Ambitious Analytical Has leadership abilities Willing to take a stand
Gender Equitable Men (GEM)	Gender Equity (GE)	• The couple should decide together if they want to have children. • Either a man or a woman can suggest using a condom. • If a guy gets a woman pregnant, the child is the responsibility of both. • Man/woman should know what his/her partner likes during sex. • The participation of the father is important in raising children, even if he is no longer with the mother. • A man and a woman should decide together what type of contraceptive to use. • A real man can take care of his children as done by a woman.
KANITA Domestic Violence against Women	Attitudes Supporting Domestic Violence (ASDV)	• Violence can be tolerated under certain circumstances. • Wives could be scolded by their husbands when they disagreed or opposed their husbands. • Wives can be beaten by their husbands when they disagreed or opposed their husbands. • In a romantic relationship, a boyfriend can scold his girlfriend if she does something that boyfriend does not like. • The wives can be beaten by the husbands when they nag. • The wife can be beaten by the husband when she has cheated on him. • The issue of domestic violence is better solved privately.

Malaysian men from urban areas in Peninsular Malaysia aged between 20 and 64 years with different levels of education but with adequate proficiency in Bahasa Malaysia. Data was collected using a convenience sampling method. Before respondents were given the questionnaire, enumerators provided a brief description of this study, assured them of the confidentiality of the study results and asked the respondents to sign an informed-consent form. While the respondents answered the questionnaire the enumerators were available for questions and to respond to any doubts on the parts of the participants. In total, 168 of 200 questionnaires were returned as completed (a response rate of 84%). This research was approved by the Ethics Committee of Universiti Sains Malaysia.

Data Analysis

We used partial least squares–structural equation modeling (PLS-SEM) to assess our proposed conceptual framework, included our measurement and structural models. PLS-SEM is a non-parametric technique that can be executed using small sample sizes, and which does not require a normal distribution of data.⁴⁴ It also can be applied to different types of research.^{45,46} Also, PLS-SEM can be used when the model is inclusive of reflective and formative constructs.⁴⁷ We chose PLS-SEM because our study framework contains both reflective and formative constructs. Moreover, by applying PLS-SEM, we can assess the validity and reliability of constructs, while simultaneously analyzing the relationships between all the variables

in the conceptual model.⁴⁸ WarpPLS 6.0⁴⁹ was used to analyze the data and to perform the PLS-SEM analysis.

To compute the suitable sample size for this study, we used G*Power 3.1, a statistical power analysis program for model testing.⁵⁰ Based on a power of 0.95, with 5 constructs, 0.05 significance level (α), and the effect size (ES) of 0.15, it was calculated that we need a minimum sample size of 100. Moreover, given the “ten times rule” for PLS-SEM analysis⁵¹ and previous studies indicating the acceptability of a sample threshold of as little as 100 samples for PLS-SEM,⁵² we could conclude that a sample size of 168 was acceptable to test our proposed model.

Results

Profile of Respondents

As shown in Table 2, the respondents were categorized into four age groups: 20-29 years (40.5%); 30-39 years (25.0%); 40-49 years (22.0%); and 50 years and above (12.5%). As indicated, most of the respondents were under 40 years of age. The majority of respondents had either a diploma or a lower level of education (54.8%) and rest had a degree in higher education level (45.2%). Most of the respondents were married (55.4%), and the remainder were single (44.6%), with a minuscule number of respondents divorced in the preceding years.

Table 2. Instrument measures and related items

Characteristics	Frequency	Percentage (%)
<i>Age (years)</i>		
20-29	68	40.5
30-39	42	25.0
40-49	37	22.0
50 and above	21	12.5
<i>Level of education</i>		
Diploma and below	92	54.8
Higher education (Degree/Master/Ph.D.)	76	45.2
<i>Marital status</i>		
Single	75	44.6
Married	93	55.4

Descriptive Analysis

The result of descriptive analysis for the respondents' masculine traits, attitudes supporting domestic violence, and perceptions of gender equity in family planning are indicated in Table 3. As shown in the table, the responses for the items associated with masculine traits ranged from 2.98 to 5.54. The mean values of the items associated with the attitudes supporting domestic violence were less than the mean values associated with the masculine traits, ranging from 1.83 to 4.50. The highest mean value was for the statement, “the issue of domestic violence is better solved privately” while the item with the lowest mean value was the statement, “the wives can be beaten by the husbands when they nag”. The mean values for the items associated with the perceptions of gender equity in family planning ranged from 2.48 to 2.83. The item with the highest mean value was, “if a guy gets a woman pregnant, the child is the responsibility of both.” Conversely, the item with the lowest mean value was, “either a man or a woman can suggest using a condom”. These results indicated that most of the respondents have favorable perceptions of gender equity in family planning.

Assessment of Model Using PLS-SEM

To assess the model using PLS-SEM, both measurement and structural models should be assessed.^{51,53}

1. Assessment of Measurement Model

In assessing the measurement model, the relationships between each variable and its associated observable items were subject to testing. The conceptual framework for the current study involved three single-item variables (age, education, and marital status), two reflective variables (perceived gender equity in FP, and attitudes supporting domestic violence), and one formative variable (masculine traits). Single-item variables were excluded from the assessment of the measurement model.

To assess the reliability and validity of the reflective variables, the Composite Reliability (CR) and Average Variance Extracted (AVE) should be assessed.⁵¹ To establish indicator and variable reliability, the loading of each

Table 3. The results of descriptive analysis

Items	Mean Value	Standard Deviation
<i>Perceived gender equity in family planning</i>		
The couple should decide together if they want to have children.	2.70	0.54
Either a man or a woman can suggest using a condom.	2.48	0.61
If a guy gets a woman pregnant, the child is the responsibility of both.	2.83	0.40
Man/woman should know what his/her partner likes during sex.	2.70	0.49
The participation of the father is important in raising children, even if he is no longer with the mother.	2.79	0.44
A man and a woman should decide together what type of contraceptive to use.	2.75	0.43
A real man can take care of his children as done by a woman.	2.78	0.41
<i>Domestic violence supportive attitudes</i>		
Violence can be tolerated under certain circumstances.	2.25	1.45
Wives could be scolded by their husbands when they disagreed or opposed their husbands.	3.45	1.74
Wives can be beaten by their husbands when they disagreed or opposed their husbands.	2.29	1.49
In a romantic relationship, a boyfriend can scold his girlfriend if she does something that boyfriend does not like.	3.10	1.70
The wives can be beaten by the husbands when they nag.	1.83	1.26
The wife can be beaten by the husband when she has cheated on him.	2.91	1.79
The issue of domestic violence is better solved privately.	4.50	1.70
<i>Masculine traits</i>		
Self-reliant	5.19	1.16
Defends own beliefs	5.29	1.01
Independent	5.54	1.06
Athletic	3.76	1.62
Assertive	4.95	1.21
Has a strong personality	5.14	1.10
Forceful	2.98	1.49
Analytical	5.06	1.18
Has leadership abilities	5.32	1.14
Willing to take risks	5.03	1.35
Makes decisions easily	4.63	1.40
Self-sufficient	4.99	1.41
Dominant	3.76	1.42
Masculine	4.75	1.39
Willing to take a stand	4.98	1.11
Aggressive	3.72	1.55
Acts as a leader	4.81	1.37
Individualistic	3.62	1.55
Competitive	4.99	1.17
Ambitious	5.44	1.14

observable item on its associated variable should be higher than 0.7 to be considered acceptable.^{46,47} Table 3 shows that most items had a loading higher than 0.7 and that the CR for the reflective variables were higher than 0.7. Items with loadings below 0.4 were removed if their CR and AVE didn't exceed the threshold of 0.7 for CR and 0.5 for AVE.⁵¹

Convergent validity should be checked to assess the validity of the reflective variables.⁵¹ For acceptable convergent validity, the AVE of the variable should be greater than 0.5. **Table 4** shows that all of the reflective variables had an AVE above 0.5. Therefore, the results indicate

an acceptable level of reliability and convergent validity for the reflective variables in the model.

To assess the formative variable, the Variance Inflated Factor (VIF) or collinearity between the items associated with the formative variable should be less than five and the outer weight of the items should be significant (51,53). Table 3 shows that each of the items associated with perceived masculinity as a formative variable had an acceptable degree of VIF (<5) and that the outer weight of these items was significant (p-value<0.05).

2. Assessment of Structural Model

To assess the structural model or test the proposed hypotheses, the relationships between the variables were examined. In this regard, the value of R² depends on the research area and the significance of path coefficients should be checked.^{51,53} In this study, the R² value was 0.26 which is considered both high and acceptable for behavioral research.⁵¹

Table 4. Instrument measures and related items

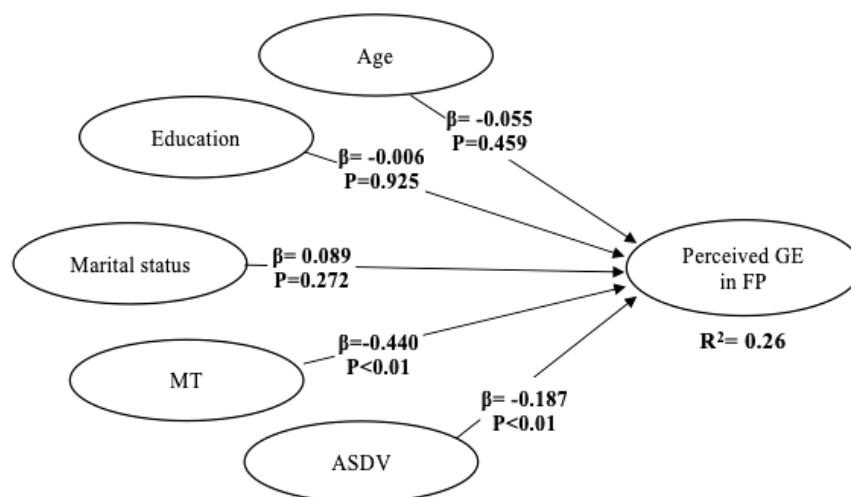
Items	Construct type	Loading/weights	CR	AVE	p- value	Full Collinearity / VIFs
<i>Perceived gender equity in FP</i> If a guy gets a woman pregnant, the child is the responsibility of both. Man/woman should know what his/her partner likes during sex. The participation of the father is important in raising children, even if he is no longer with the mother. A man and a woman should decide together what type of contraceptive to use.	Reflective	.766 .748 .764 .737	.840	.568		1.03
<i>Domestic violence supportive attitudes</i> Violence can be tolerated under certain circumstances. Wives can be beaten by their husbands when they disagreed or opposed their husbands. The wives can be beaten by husbands when they nag. The wife can be beaten by the husband when she has cheated on him.	Reflective	.695 .903 .813 .602	.844	.581		1.04
<i>Masculine traits</i> Self-reliant Defends own beliefs Independent Athletic Assertive Has a strong personality Forceful Analytical Has leadership abilities Willing to take risks Makes decisions easily Self-sufficient Dominant Masculine Willing to take a stand Aggressive Acts as a leader Individualistic Competitive Ambitious	Formative	.238 .383 .010 .282 .011 .416 .550 .223 .333 .292 .333 .123 .005 .295 .135 .058 .106 .220 .325 .268	NA	NA	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05	1.91 2.50 1.97 1.59 1.87 2.03 1.45 1.43 2.32 1.93 1.40 1.49 1.67 1.45 1.75 1.51 1.81 1.44 1.58 1.93

Table 5 and **Figure 2** indicate the results of the hypothesis testing. The results of this study support the significant and negative effects of perceived masculinity and attitudes supporting violence (H4 and H5) on gender equity in family planning. The findings do not support this being impacted by

sociodemographic characteristics including age, education and marital status (H1-H3). Also, the results indicate that the effect of masculinity on gender equity in family planning is much stronger than the effect of attitudes supporting domestic violence.

Table 5. Results of hypothesis testing.

Hypothesis				Path coefficient	P-value	Supported
H1	Age	→	Perceived GE in FP	-0.066	0.340	No
H2	Education	→	Perceived GE in FP	0.010	0.878	No
H3	Marital Status	→	Perceived GE in FP	0.137	0.064	No
H4	MT	→	Perceived GE in FP	-0.445	<0.01	Yes
H5	ASDV	→	Perceived GE in FP	-0.145	<0.05	Yes

**Figure 2.** Results of structural model assessment

Discussion

This study demonstrated that men had favorable perceptions of gender equity in family planning. However, men's adherence to masculine traits and attitudes supporting domestic violence negatively affected their perceptions of gender equity in family planning. The results were, therefore, consistent with previous studies confirming that masculinity and these attitudes towards domestic violence reinforce gender inequity particularly within the context of family planning.^{24,26,35,54,55} The data analysis did not show associations between men's age, education level and marital status, and their perceptions of gender equity in family planning.

The results reflect that gender-based attitudes of Malaysian men are central to their perceptions of gender equity in family planning. There is evidence that inter-spousal communication and gender relations are closely linked to successful family planning practices^{56,57} such as contraceptive adoption, use effectiveness and contraceptive continuation.^{54,58} Most studies carried out in Malaysia, however, conclude that there is inequality in gender relations and men hold a dominant position in family planning.⁵⁹

Considering the result of the current study, it can be concluded that men's perceptions and support of gender equity in family planning are of crucial importance, especially given the relative authority of Malaysian men in the home and community. Becoming aware of gender relations and power imbalances within couples would help to achieve better outcomes in family planning.⁶⁰

In response to such issues, the UNFPA has developed a program advisory note on 'partnering' as a new approach to gender relations and improving the outcome of family planning and reproductive health matters.⁶⁰ This approach sees family planning as an expression of gender and power relations between men and women.⁶¹ It emphasizes the importance of supportive and responsible partnership between the members of a couple in joint decisions and practices concerning family planning.

There are some strengths and limitations to this study. Since most developing countries including Malaysia, family planning programs are ill-equipped to cope with the goals emphasized by the gender equity approach, the main strength of this study is that it has some valuable practical implications for local authorities. Local

authorities should consider the importance of framing a practical agenda that engages with men to enhance their gender awareness and positive attitudes towards gender equity in family planning. Some intervention programs with a gender transformative approach are needed to enhance men's equal participation within the context of family planning. A gender transformative approach seeks to promote the transformation of gender norms and power balance and aims for a more gender-equitable relationship between men and women.^{62,63} This could be achieved through addressing and challenging traditional gender inequitable norms such as those concerning masculine roles and domestic violence against women. These interventions will increase men's awareness about the crucial roles that they can play as supportive and responsible partners in family planning and health outcomes.

Furthermore, this study not only examines the influence of gender related factors (masculine traits and attitudes supporting domestic violence) on perceptions of gender equity in family planning but also relies on data that is drawn directly from men. Much of the existing body of research on men in family planning is either limited to demographic and economic factors associated with their reported contraceptive use or targets women as respondents. The study of men's attitudes, particularly concerning gender related factors, therefore provides unique insights into family planning.³⁵ This study can be considered novel because, unlike previous related studies, it has applied partial least squares- structural equation modeling and thus contributes to the men and family planning literature both theoretically and methodologically. This study also contributed to addressing the paucity of literature on family planning in the context of Malaysia.

The result of this study, however, might have limited generalizability. In light of this, further

studies should be conducted with a focus on men who live in East Malaysia including Sabah, Sarawak and Labuan to obtain more generalizable results.

Conclusion

Overall, this study reflected the existence of gender-related factors hampering men's perceptions of gender equity in family planning. Promoting the adoption of attitudes among men supporting gender equity can result in men's supportive and responsible participation in family planning. This study, therefore, highlights the importance of enhancing gender equity in family planning, of intervention programs that have a gender transformative approach to reducing men's harmful reliance on certain masculine traits and attitudes towards domestic violence.

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Conflicts of interest

The authors declared no conflicts of interest with this article.

How does this paper make a difference to general practice?

- This study reflected the existence of factors hampering gender equity in family planning.
- Masculine traits and attitudes supporting domestic violence negatively affect gender equity in family planning.
- This study showed that perceived gender equity in family planning is lower with men who had high levels of masculine traits and attitudes supporting domestic violence.
- Understanding men's gender-based attitudes are important to develop a successful family planning program.

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Factors associated with depression, anxiety and stress among patients with diabetes mellitus in primary health care: Many questions, few answers

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Abstract

Introduction: People with diabetes mellitus (DM) may have concurrent mental health disorders and have been shown to have poorer disease outcomes.

Objective: The aim of this study to determine the prevalence of DASS in patients with diabetes mellitus without mental disorders, aged 20 years or more, in primary health care, and to determine any association between DASS and patients' sociodemographic and clinical attributes.

Methods: This was a cross-sectional study conducted in a primary health care center, in the department of general practice. Patients with DM who visited the doctor and agreed to fill in the questionnaire were included in the study. Data were collected using the questionnaire DASS-21. Descriptive statistics, the Pearson chi-square test, and logistic regression analysis were used to analyze the data.

Results: Out of a total of 102 respondents with DM, 29 (28.4%) had some form of psychological symptoms. The prevalence of DASS was 16.7%, 16.6%, and 23.5%, respectively. There was no significant difference between sociodemographic variables according to stress status. Respondents aged 40–49 years more often showed emotional states of depression and anxiety. There was a significant association between emotional status of DASS and HbA1c values. Logistic regression analysis indicated that age (OR=2.57, 95% CI: 1.59–4.13) was a predictor of depression and anxiety.

Conclusion: Unpleasant emotional states DASS are common in patients with DM, depression (16.7%), anxiety (16.6%), and stress (23.5%). Age is the strongest predictor of DASS status. The screening and monitoring of unpleasant emotional states in people with diabetes should be performed from a young age.

Introduction

The incidence of diabetes mellitus is increasing. It is recognized that many person with chronic illnesses also have undiagnosed comorbidities, including depression, anxiety, and stress (DASS).¹ People with diabetes mellitus may have concurrent psychological symptoms and are shown to have poor disease outcomes.² Mental illness or mental health disorders, which refer to a wide range of mental health conditions, affect mood, thinking, and behavior.³ Some mental illnesses include depression, anxiety disorders, schizophrenia, eating disorders, and addictive behaviors. Signs and symptoms of mental illness can vary and can affect emotions, thoughts, and behaviors. Sometimes mental health disorder symptoms present as physical problems, such as headaches, back pain, stomach pain, or other unexplained pains.^{3,4}

In this country, approximately 600,000 persons (8.2% of the population) suffer from diabetes. In Serbia, as in developed countries worldwide, diabetes is the fifth leading cause of death⁵ and also the fifth cause of disease.⁶ In this country, approximately 3,000 persons die from this disease each year.⁵ The World Health Organization projected that 438 million people will fall ill from diabetes by 2030. Although the highest incidences are recorded in developed countries, the largest increase in diabetes diagnoses is expected in developing countries like this one.⁷ More studies have been done to determine the prevalence of depression, anxiety, and stress (DASS) in patients with diabetes.^{2,8–10} Adverse socioeconomic circumstances early in life increase the risk of diabetes mellitus and late-life cognitive disorders.¹¹ DM often appears as a co-morbidity of a more psychiatric illnesses, complicating its outcome. People with diabetes are 1.5 times more likely to develop

DASS, especially anxiety and depression, regardless of age, ethnicity, or socioeconomic status.¹² Although psychological and psychiatric problems are frequently present in people with DM, in most cases these are neither diagnosed nor treated, to the patients' detriment.^{13,14}

This study was conducted to determine the prevalence of DASS in primary care patients 20 years or older with DM without DASS and to determine any association between DASS and patients' sociodemographic and clinical characteristics.

Methods

1. Study Design

This was a cross-sectional study conducted from December 2017 until February 2018. This study was conducted in the primary healthcare center in New Belgrade in the department of general practice.

This study included patients 20 years or older with diabetes mellitus (DM), without the presence of DASS, who visited the doctor for one reason or another. Patients diagnosed with mental disorders were excluded from the study. The prevalence of depression in the area studied ranged from 8 to 18%. The minimum number of samples was calculated using Kish's formula: Sample size = $z^2 (p (1-p)/c^2)$, where $z = 1.96$ for 95% confidence interval (CI)

In this equation, p = prevalence (of depression for DM based on Andreoulakis study: 8-18%),¹⁰ and c = desired level of precision. The minimum sample size was 113 DM patients but without mental disorders.

2. Study Variables

Data were collected using the questionnaire DASS-21.¹⁵ Patients with DM who visited the doctor and agreed to fill out the questionnaire were included in the study. This self-administered questionnaire consisted of three sections: sociodemographic information, DM severity, and DASS detection, and it was given to the patients when visiting a doctor of general practice.

The sociodemographic data of the patients were recorded, including age, sex, marital status, education level, and occupation. Factors that could affect DM severity were also recorded, such as smoking status, presence of comorbidities, family history of DM, DM duration, therapy, number of doctor's visits, HbA1c levels, and blood sugar levels. The section on the detection of DASS was completed using the validated DASS-21 questionnaire. The DASS-21 questionnaire has 21 items, a set of three self-reported scales designed to measure DASS. The DASS-21 questionnaire has been translated into multiple languages, including Serbian, which has been validated for its use.¹⁵ The DM patients were asked to estimate their experience of each symptom on a 4-point severity scale ranging from 0 ("does not apply to me") to 3 ("applies to me most of the time"). These scores were added up and categorized as normal, mild, moderate, severe, or extremely severe, according to the manual. Values of DASS obtained were then transformed for further analysis. The DASS has no direct implications for the allocation of patients to diagnostic categories postulated in classification systems, since it is predominantly aimed to measure DASS symptoms in both clinical and nonclinical samples. Therefore, the DASS-21 questionnaire is only a screening tool.¹⁶

3. Statistical Analysis

All questionnaires were checked and entered into the statistical software SPSS 20. Data were expressed as frequencies (%) for categorical variables, and all the continuous variables were expressed as mean and standard deviations. The Pearson chi-square test was used to measure the differences between the variables. Significant associations were found, with a p -value < 0.05 .

All variables that were significantly associated with the outcome measure ($p < 0.05$) were entered into a logistic regression model and were identified as outcome predictors. Finally, the odds ratios (OR) and confidence intervals (95% CIs) were also calculated.

Results

A total of 102 patients who visited a PHC doctor successfully completed the questionnaire. Out of a total of 102 respondents with DM, 29 (28.4%) displayed psychological symptoms. The prevalence of depression, anxiety, and stress was 16.7%, 16.6%, and 23.5%, respectively. The mean patient age was 50 ± 7.86 years. Almost 52% of the respondents had secondary education. Approximately 77.5% of respondents were employed. More than half of the respondents had a positive family history of DM (55.9%), and more than two-thirds of the respondents (67.6%) had concurrent co-morbidities, and a majority of the patients received only oral medication (72.5%), whereas 10.8% received a combination of both oral medication and insulin. The average blood sugar level was 7.2 and HbA1c 6.4%. The sociodemographic characteristics of the respondents are shown in **Table 1**.

Table 1. Frequency distribution of respondents by sociodemographic and clinical characteristics

Sociodemographic and clinical characteristics	N (%)
Sex	
Male	49 (48.0)
Female	53 (52.0)
Marital status	
Single	21 (20.6)
Married	78 (76.5)
Widow/er	3 (2.9)
Age (years)	
≤29	1 (1.0)
30-39	8 (7.8)
40-49	38 (37.3)
50-59	41 (40.2)
≥60	14 (13.7)
Education	
Primary school	3 (2.9)
Secondary school	53 (52.0)
University	46 (45.1)
Occupation	
Employed	79 (77.5)
Unemployed	23 (22.5)
Family history of DM	
No	45 (44.1)
Yes	57 (55.9)
Smoking	
Smokers	51 (50.0)
Nonsmokers	51 (50.0)
Comorbidity	
No	33 (32.4)
Yes	69 (67.6)
DM therapy	
Oral	74 (72.5)
Insulin	17 (16.7)
Oral + insulin	11 (10.8)
DM duration (years)	
≤ 1	16 (15.7)
1 – 4.9	44 (43.1)
5 – 9.9	33 (32.4)
10 – 14.9	6 (5.9)
≥ 15	3 (2.9)

<i>Frequency of visits</i>	
Once a month	54 (52.9)
Once in two months	33 (32.4)
Once in three months	15 (14.7)
<i>Blood sugar</i>	
≤ 6.0	12 (11.8)
≥ 6.1	90 (88.2)
<i>HbA1c</i>	
≤ 5.6	14 (13.7)
5.7 – 6.5	52 (51.0)
≥ 6.6	36 (35.3)

Table 2 shows the differences between the DASS statuses and sociodemographic variables of the respondents. There was no significant difference between sociodemographic variables according to stress status, but there was a significant difference between sociodemographic variables according to depression and anxiety statuses. Respondents aged 40–49 years more often displayed depression or anxiety. However, anxiety was more prevalent among respondents who were employed.

Table 2. Difference between DASS status and sociodemographic characteristics

Sociodemographic characteristic N (%)	Depression		Anxiety		Stress	
	No	Yes	No	Yes	No	Yes
<i>Sex</i>						
Male	41 (48.2)	8 (47.1)	41 (48.2)	8 (47.1)	36 (46.2)	13 (54.2)
Female	44 (51.8)	9 (52.9)	44 (51.8)	9 (52.9)	42 (53.8)	11 (45.8)
<i>Marital status</i>						
Single	19 (22.4)	2 (11.8)	19 (22.4)	2 (11.8)	18 (23.1)	3 (12.5)
Married	63 (74.1)	15 (88.2)	63 (74.1)	15 (88.2)	57 (73.1)	21 (87.5)
Widow/er	3 (3.5)	0 (0)	3 (3.5)	0 (0)	3 (3.8)	0 (0)
<i>Age (years)</i>						
≤29	1 (1.2)	0 (0)	1 (1.2)	0 (0)	1 (1.3)	0 (0)
30-39	7 (8.2)	1 (5.9)	7 (8.2)	1 (5.9)	7 (9.0)	1 (4.2)
40-49	25 (29.4)	13 (76.5)*	26 (30.6)	12 (70.6)*	25 (32.1)	13 (54.2)
50-59	38 (44.7)	3 (17.6)	37 (43.5)	4 (23.5)	33 (42.3)	8 (33.3)
≥60	14 (16.5)	0 (0)	14 (16.5)	0 (0)	12 (15.4)	2 (8.3)
<i>Educational</i>						
Primary school	3 (3.5)	0 (0)	2 (2.4)	1 (5.9)	2 (2.6)	1 (4.2)
Secondary school	45 (52.9)	8 (47.1)	45 (52.9)	8 (47.1)	41 (52.6)	12 (50.0)
University	37 (43.5)	9 (52.9)	38 (44.7)	8 (47.1)	35 (44.9)	11 (45.8)
<i>Occupation</i>						
Employed	63 (74.1)	16 (94.1)	62 (72.9)	17 (100.0)*	58 (74.4)	21 (87.5)
Unemployed	22 (25.9)	1 (5.9)	23 (27.1)	0 (0)	20 (25.6)	3 (12.5)

There was a significant association between the emotional statuses of DASS and the HbA1c values of the respondents, especially in pre-diabetic values. In addition, there was a significant difference between anxiety status and positive family history and stress status and appearance of higher blood sugar (**Table 3**).

Table 3. Differences between DASS status and clinical characteristics

Clinical characteristic N (%)	Depression		Anxiety		Stress	
	No	Yes	No	Yes	No	Yes
<i>Family history of DM</i>						
No	40 (47.1)	5 (29.4)	42 (49.4)	3 (17.6)	38 (48.7)	7 (29.2)
Yes	45 (52.9)	12 (70.6)	43 (50.6)	14 (82.4)*	40 (51.3)	17 (70.8)
<i>Smoking</i>						
Smokers	41 (48.2)	10 (58.8)	43 (50.6)	8 (47.1)	40 (51.3)	11 (45.8)
Nonsmokers	44 (51.8)	7 (41.2)	42 (49.4)	9 (52.9)	38 (48.7)	13 (54.2)
<i>Comorbidity</i>						
No	26 (30.6)	7 (41.2)	27 (31.8)	6 (35.3)	27 (34.6)	6 (25.0)
Yes	59 (69.4)	10 (58.8)	58 (68.2)	11 (64.7)	51 (65.4)	18 (75.0)
<i>DM therapy</i>						
Oral	59 (69.4)	15 (88.2)	59 (69.4)	15 (88.2)	57 (73.1)	17 (70.8)
Insulin	15 (17.6)	2 (11.8)	16 (18.8)	1 (5.9)	13 (16.7)	4 (16.7)
Oral + insulin	11 (12.9)	0 (0)	10 (11.8)	1 (5.9)	8 (10.3)	3 (12.5)
<i>DM Duration (years)</i>						
≤ 1	15 (17.6)	1 (5.9)	15 (17.6)	1 (5.9)	15 (19.2)	1 (4.2)
1 – 4.9	36 (42.4)	8 (47.1)	35 (41.2)	9 (52.9)	33 (42.3)	11 (45.8)
5 – 9.9	26 (30.6)	7 (41.2)	27 (31.8)	6 (35.3)	24 (30.8)	9 (37.5)
10 – 14.9	5 (5.9)	1 (5.9)	5 (5.9)	1 (5.9)	3 (3.8)	3 (12.5)
≥ 15	3 (3.5)	0 (0)	3 (3.5)	0 (0)	3 (3.8)	0 (0)
<i>Number of visits</i>						
Once a month	42 (49.4)	12 (70.6)	43 (50.6)	11 (64.7)	38 (48.7)	16 (66.7)
Once in two months	28 (32.9)	5 (29.4)	28 (32.9)	5 (29.4)	27 (34.6)	6 (25.0)
Once in three months	15 (17.6)	0 (0)	14 (16.5)	1 (5.9)	13 (16.7)	2 (8.3)
<i>Blood sugar</i>						
≤ 6.0	11 (12.9)	1 (5.9)	12 (14.1)	0 (0)	12 (15.4)	0 (0)
≥ 6.1	74 (87.1)	16 (94.1)	73 (85.9)	17 (100.0)	66 (84.6)	24 (100.0)*
<i>HbA1c</i>						
≤ 5.6	12 (14.1)	2 (11.8)	13 (15.3)	1 (5.9)	14 (17.9)	0 (0)
5.7 – 6.5	39 (45.9)	13 (76.5)*	38 (44.7)	14 (82.4)*	33 (42.3)	19 (79.2)*
≥ 6.6	34 (40.0)	2 (11.8)	34 (40.0)	2 (11.8)	31 (39.7)	5 (20.8)

Logistic regression analysis (Table 4) indicated that age (OR=2.57, 95% CI: 1.59-4.13) was a predictor of depression and anxiety statuses. Therefore, DM patients should be tested with the DASS questionnaire at a young age. Other variables (occupation, family history of DM, blood sugar, HbA1c) were not predictors of DASS status.

Table 4. Logistic regression model with DASS status as the dependent variable

Independent variable	Depression			Anxiety			Stress		
	B	OR (95%CI)	p value	B	OR (95%CI)	p value	B	OR (95%CI)	p value
Age (years)	-1.062	0.35 (0.15 - 0.79)	0.012	-1.104	0.33 (0.13 - 0.86)	0.023	-0.222	0.80 (0.44 - 1.44)	0.460
Occupation	-1.619	0.19 (0.18 - 2.14)	0.182	-19.909	0	0.998	-0.597	0.55 (0.13 - 2.27)	0.408
Family history of DM	0.545	1.72 (0.50 - 5.88)	0.384	1.233	3.43 (0.83 - 14.23)	0.089	0.739	2.09 (0.75 - 5.82)	0.157
Blood sugar	-0.006	0.99 (0.75 - 1.31)	0.968	-0.320	0.73 (0.44 - 1.19)	0.207	0.003	1.00 (0.78 - 1.28)	0.981
HbA1c	-0.767	0.46 (0.17 - 1.26)	0.133	-0.652	0.52 (0.18 - 1.51)	0.231	-0.190	0.83 (0.37 - 1.85)	0.644

Discussion

The present study has shown that depression, anxiety, and stress are commonplace in patients with DM. The prevalence of DASS in our study was 16.7%, 16.6%, 23.5% respectively. Many studies showed the prevalence of depression among diabetic patients to be within the range of 8.5–27.3%. This was similar compared with other studies using the DASS-21 assessment tool.^{2,9,10,17-19}

This study found that an elevated HbA1c level was an independent risk factor of DASS.⁹ Several studies, including ours, have shown a positive association between HbA1c levels and DASS status.^{20,21} In a study in the Netherlands, several individual depressive symptoms were related to higher HbA1c levels in DM outpatients, and these associations persisted over time.²² This explained the increase in glycemia, enhanced inflammation, and insulin resistance.²³⁻²⁵ Furthermore, DASS status was also linked with poorer behavioral management of diabetes and glycemic control.²⁶ A number of studies have shown that depression is associated with poor perceived control of diabetes and poor self-care behaviours.²⁷ In addition, measurement of HbA1c might provide patients with reassurance; as a result, these patients were less depressed. Stress status has been also associated with glucose levels in DM patients. Those sick from both depression and diabetes also tend to have higher primary healthcare costs. Depression among diabetics is associated with poor glycemic control, which is one of causes of diabetic complications.²⁸ This not only puts a great burden on the healthcare system but also directly affects quality of life for patients.¹²

Our study also found that occupation appears to be a predictor for anxiety symptoms. Patients who were working were more likely to experience anxiety compared with those who were unemployed. Those employed may have been too busy to understand their illness and thus did not have time to focus on their health, which may explain their lack of DM control.

Our study revealed that a family history of DM was also a predictor of anxiety. These findings were consistent with other studies, which showed that family history was a predictor of DASS among patients with diabetes.^{9,15,18,29}

Along the same lines, age was associated with symptoms of depression and anxiety. Findings for the relationship between age and depression

in diabetes have been conflicting, with some studies reporting age as a risk factor for depression and other studies showing that younger age was related to depressive symptoms in DM patients.^{30,31} Our study shows that DM patients should be tested with the DASS questionnaire at a young age, preferably at the onset of the disease. Research has shown an increasingly clear relationship between DM and a variety of mental health issues, which indicates that DM patients should be tested as early as possible.^{32,33} In light of the prevalence of DM with psychiatric comorbidities and the negative impacts of these factors, individuals with diabetes should be regularly screened with validated questionnaires or clinical interviews.³³⁻³⁵

Various social and clinical factors, such as gender, marital status, level of education, DM duration, smoking status, number of doctor's visits, DM therapy, and comorbidities, were predicted to be associated with DASS status, but our study failed to prove such an association.²⁰ The high prevalence of DASS and the limited number of predictors imply that all patients with diabetes should be screened for DASS. Some researchers have suggested screening for depression in patients with chronic diseases, such as DM.^{17,36}

Several limitations may restrict broader application of our study. The findings of this research are limited to the PHC center in Belgrade and therefore reflect only one main city in Serbia and an even smaller sample size. For better representation and associations, we recommend that future studies involve a larger number of samples. Since this was a cross-sectional study, it did not allow for cause-and-effect relationships to be studied. Second, the DASS-21 questionnaire is only a screening tool and not diagnostic of specific psychiatric disorders. Finally, there remains the possibility of recall biases from respondents.

Conclusion

Clearly, our results show that unpleasant emotional states, DASS, are common in DM patients in Belgrade, with 16.7% experiencing depression, 16.6% experiencing anxiety, and 23.5% experiencing stress. Age is the strongest predictor of DASS status. The screening and monitoring of DASS in people with DM should be performed from

a young age. These findings also suggest that the healthcare system must evolve to better address the psychological burdens associated with diabetes. It is essential that health professionals conduct early assessments and identify DASS states in people with DM.

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Ethical approval: The study was approved by the Ethics Committee of the Primary Health Care Center New Belgrade no. 29/5. Participation in the research was voluntary. Anonymity, confidentiality, and privacy of data were explained and guaranteed. Verbal consent was obtained from participants after explaining the research aims and the confidentiality of data.

Conflicts of interest: I declare that I have no financial or personal relationship(s) which may have inappropriately influenced me in writing this paper.

How does this paper make a difference to general practice?

- The incidence of diabetes mellitus is increasing.
- People with diabetes have a greater risk of developing unpleasant emotional states, depression, anxiety, and stress.
- DASS among diabetics is associated with poor glycemic regulation.
- This puts a great burden on the healthcare system but also directly affects quality of life in patients.
- The screening and monitoring of unpleasant emotional states in people with diabetes should be performed as soon as possible, preferably at the onset of the disease.

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Bodyweight status misperception among reproductive-aged women in primary care settings

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Abstract

Introduction: It is common, and many international and local studies confirm this, that women of reproductive age misperceive their body-weight status. This phenomenon can lead to their being less likely to adopt a healthy lifestyle which later exposes them to increased health problems and risks including those of a gynecological and obstetric nature. Generally, there have been inconsistent findings concerning the association between the self-perceived weight status and sociodemographic factors, physical activities, and previous weight loss attempts of women of reproductive age in an Asian population like Malaysia.

Objective: This study aimed to determine the factors associated with body weight status misperception among reproductive-aged women at a primary care setting in Malaysia.

Methods: This is a cross-sectional study conducted at Klinik Kesihatan Durian Tunggal in 2016-2017. The questionnaire included questions on the perception of weight status, sociodemographic factors, smoking status, level of physical activity, and weight loss attempts. Logistic regressions were used for statistical analysis to examine the association between body weight status misperception and related factors.

Results: The study recruited 630 reproductive-aged women. The mean age and SD of the respondents was 32.7 + 8.9 years, and 84% of the respondents were Malays. More than three-quarters of the respondents (75.5%, n = 476) had received up to a secondary level of education. The majority of the respondents were in the overweight/obese group (59.4%, n = 374). The mean BMI of the respondents was 27.1 kg/m² + 6.61. Approximately 65.4% (n = 412) of the respondents had an inactive lifestyle. However, 60% (n = 378) of the respondents reported that they had attempted to reduce their weight in the last year. A total of 141 respondents (22.4%) misperceived their weight status with 113 (80.1%) of them underestimating their weight status. Women with primary-level education (OR: 3.545, 95% CI: 1.530-8.215, p = 0.003) and secondary-level education (OR: 1.933, 95% CI: 1.065-3.510, p = 0.030) had a greater likelihood of misperceiving their body weight status as compared to those who have a tertiary level of education. Women with no weight loss attempts were also at risk of body weight status misperception (OR: 1.850, 95% CI: 1.195, 2.865, p = 0.006).

Conclusion: Bodyweight status misperception among reproductive-aged women was associated with a low level of education and with those who had made no weight loss attempts. Identifying women who are at risk of misperceiving their weight status would enable early counseling on weight management.

Background

The global prevalence of obesity is increasing.¹ In Malaysia, the obesity prevalence had an increase of 280% in fewer than ten years and the trend is expected to continue rising over time.¹ The National Health and Morbidity Survey in 2011 on the prevalence of overweight and obesity among adult Malaysians reported that the overall prevalence of overweight and obesity were 33.6% and 19.5% respectively, with more females being obese than males.² Besides the rising prevalence of overweight and obesity, Asian women are underweight in a larger

proportion comparing with other countries. In Asian countries, the underweight prevalence is particularly high. For Thailand, this is a rate of 19.2%,³ for Malaysia 9.6%,³ and for Vietnam 20.9%.⁴ When compared to populations of other ethnicities, pre-gravid low maternal weight was more common in women of Asian (8.6%) and Hispanic (4.3%) ethnicity compared to Caucasian (2.5%) or African American (1.9%)⁵ women. Both underweight, as well as overweight, coexist in all countries and many developing countries face the dual challenge of continuing underweight populations and an expanding overweight population.⁶

Women who were overweight or obese before their first pregnancy have a propensity to maintain their weight or gain more weight after pregnancy than those of a normal weight.⁷ Maternal obesity is thus a natural extension of obesity in the general population. Such body habitus has its complications. It may interrupt the menstrual cycle, which can lead to low potential to become pregnant and, should such women become pregnant, their overweight or obese status could lead to a complicated or problematic gestation. Obesity can alter oocytes and embryo quality,⁸ increase the risk of gestational diabetes mellitus (GDM),⁹ increase the risk of post-date delivery,¹⁰ and increase the rate of miscarriage.¹¹

On the other hand, being underweight may also produce risks for reproductive-aged women as adequate pre-pregnancy weight and weight gain during pregnancy have been associated with better maternal and neonatal outcomes.¹² Ehrenberg et al. reported that women with pre-gravid low maternal weight were at greater risk of intrauterine growth retardation (IUGR), maternal delivery complications, prematurity, and low birth weight babies.⁵

A study in Australia found that overweight and obese people were unconcerned about their excessive weight,¹³ or that they did not recognize themselves as being overweight.¹⁴ Similarly, a Malaysian study found that over one-fifth of the study's obese subjects (21.7%) viewed themselves as being a normal weight and thus had no intention of reducing their weight.¹⁵ Misperception of body weight status might impede a person's adoption of beneficial weight-related attitudes and ¹⁶behaviors,¹⁷ and would eventually lead to unhealthy weight-loss behaviors and a lack of desire to lose weight or to do more physical activity.¹⁸

As reported in the literature, cultural and community perceptions and tolerance may play a role in the perception of body image.¹⁹ However, most studies on women's body weight perception were conducted in Western countries or among adolescent age groups. Less is known about the association of self-perceived weight status with sociodemographic factors, physical activities, and weight loss attempts of women of reproductive age in an Asian population such as that of Malaysia. Hence, determining the degree of misperception of body weight is crucial especially in women within the reproductive-age group. Factors that are associated with or related to body weight misperception may

also play a major role in planning or delivering efforts related to weight control action plans and strategies, especially among reproductive-age women. The objective of this study, therefore, was to determine body weight perception and its associated factors among reproductive-age women in a primary care setting in Malaysia.

Methods

This cross-sectional study carried out at Klinik Kesihatan Durian Tunggal, a suburban health clinic in Melaka, Malaysia was conducted between 1 December 2017 and 28 February 2018. A total of 630 participants were included in the study. The sample size was calculated with a 95% confidence interval and a 5% margin of error using the estimation between two proportions formula.²⁰ A study done by Shagar et al.²¹ determined the factors which are significantly associated with body weight status perception; ethnicity ($p = 0.045$), and level of self-esteem ($p = 0.012$). Household income, parent's educational level, weight status, eating habits, and media influence were associated with a similar p-value of less than 0.001. The researcher obtained the largest sample size of 450 concerning ethnicity. This was then divided by 0.8 (estimated response rate) and further divided by the percentage of eligibility (0.9) to get the final sample size of 630. This took into account of either any subjects with a non-response, incomplete information or refusal to participate or any subjects who did not meet the eligibility criteria for the study. Therefore, the minimum total of respondents required for this study was 630. Those included were women aged between 18 and 49 who are literate in Malay or English. Women with an acute emergency illness that needed urgent management or referral, those with comorbidity conditions that impeded physical activities and those who were pregnant or within the post-partum period were excluded because the measurement of their body weight during pregnancy or in the post-partum period might not be reflective of their actual weight status.

Height and weight measurement

Height and weight measurements were taken from the respondents using calibrated equipment (A Seca body meter scale for the height and a calibrated digital measuring scale for weight). These were taken twice before the averaged value was taken. Height was recorded in meters (m) and weight in kilograms (kg). During weighing the respondent wore light

clothing without leaning against or holding anything. Shoes, watches, keys, wallets, purses, and belts were not allowed to be worn during the weighing session. The weight was recorded to an accuracy of 0.5 kg. For the height measurement session, respondents were not allowed to wear any footwear. The respondent was required to stand erect with arms at their sides, feet positioned close together, and weight evenly distributed across both feet. The researcher stood on the respondent's right side and her chin was held firmly by the researcher's right hand. The respondent's occiput was aligned with the Frankfurt horizontal plane (an imaginary line joining the tragus of the ear and the eye). The movable sagittal-plane headpiece was put onto the respondent's head until it applied a slight pressure to reduce the thickness of the hair. The reading was measured to the nearest of 0.1cm. Body mass index (BMI) was calculated and recorded to one decimal place. To reduce the bias of weight status perception, the height and weight measurements were taken by the researcher after the respondent completed the questionnaire. The BMI categories were based on the Malaysian Clinical Practice Guideline of Management of Obesity²²: <18.5 underweight, 18.5-22.9 normal weight, and ≥23.0 overweight/obese.

Questionnaires

A self-administered questionnaire consisting of four parts was used. The first part was a single question on body weight status perception adapted from Lim and Wang.²³ The question asked was "*How do you describe your body weight?*" and the options ranged from "*very underweight*," "*slightly underweight*," "*about the right weight*," "*slightly overweight*," to "*very overweight*." The second part concerned the participant's socio-demographic profile including age, ethnicity, level of education, employment status, and household income as well as smoking status. The third part, related to weight loss attempts, was adapted from Wardle et al. that asked "*Are you trying to lose weight within this one year?*" with a possible "*Yes/No*" response.²⁴ This question included a self-reporting of any method (recommended or unhealthy) that was being used or had been used to lose weight in the preceding year. The last part of the questionnaire was the International Physical Activities Questionnaire – Short Form (IPAQ-SF) developed by the Centres for Disease Control and Prevention (CDC) in collaboration with 14 countries. The IPAQ-SF consists of 7 items with acceptable measurement

properties for use in many settings and with different languages.²⁵⁻²⁹ Both the long-form and short forms have acceptable measurement properties for use in many settings and with different languages.²⁵⁻²⁹ Although the IPAQ-Malay version short-form validation studies were not available, the IPAQ-Malay version (IPAS-M) long-form was developed and tested for reliability and validity by Chu & Moy in a study involving eighty-one Malay adults.⁺ Intra-class correlation coefficients (ICC) revealed moderate to good correlations (ICC = 0.54-0.92; $p < 0.001$) on items categorized by intensities and domains and a kappa (κ) of 0.73 for total activity. The study suggested that IPAQ-M demonstrated good reliability and validity for the evaluation of physical activity. For IPAQ scoring, there are three categories of physical activity: Level 1 for inactive, Level 2 for minimally active, and Level 3 for highly active. From the proposed categories, respondents who performed at levels 2 and 3 were considered to have adequate and good physical activity levels. For this study, the IPAQ-SF was set in dual languages, English and Bahasa Malaysia to enable respondents to have a better understanding of the questions.

Bodyweight status misperception

Misperception of body weight status in this study is defined as the subject's perception of her body weight status that is discordant with her actual BMI, as measured by the researcher during the study period. Either underestimation or overestimation of by a patient of their weight status will be considered misperception of body weight status. Respondents whose weight status perception was below their actual BMI would be considered as underestimating weight status and a respondent whose weight status perception was above her actual BMI would be considered as overestimating weight status.

Recruitment of participants took place between 1 December 2017 and 28 February 2017 using universal sampling by identifying potential respondents from the patient list in the outpatient clinic's registration book during the data-collection period. Written consent was obtained from the participants. The participants were given a set of questionnaires to answer and return on the same day. All questions other than the IPAQ-SF were self-administered. After completion of the questionnaire, the height and weight measurements were taken by the researcher followed by a face-to-face interview by the researcher for the IPAQ component.

Brief counseling was given to those with body-weight misperception regarding the importance of recognizing their weight status and of adopting a healthier lifestyle. The researcher also checked the completeness of the questionnaires and clarified missing or incomplete responses with the participants.

Data were analysed using the IBM Statistical Package for the Social Sciences (SPSS) version 22.0. The level of confidence (α) was set at 0.05 with a CI of 95%. A p -value of less than 0.05 was considered statistically significant. The study participant's characteristics were noted using descriptive analysis. A chi-squared test was used to determine any association between the independent and the dependent variables, and to measure the strength of any existing associations using the Phi coefficient or Cramer's V values. The dependent variable for this study was having or not having body-weight status misperception. The independent variables were: (i) age, (ii) ethnicity, (iii) level of education, (iv) employment status (v) household income, (vi) BMI status, (vii) smoking status, (viii) level of physical activity, and (ix) weight-loss attempts. A test for multicollinearity among the independent variables was performed before conducting a simple logistic regression (SLR). For univariate analysis, and because the dependent variable was dichotomous, the association of the factors with bodyweight misperception was conducted one by one using SLR analysis. Subsequently, variables with a p -value of less than 0.3 from the simple logistic regression analysis, as well as clinically significant variables were included in the multiple logistic regression (MLR) analysis for further analysis. The p -value was set larger than the level of significance to allow for more important variables to be included in the model.³⁰ Furthermore, Bendel & Afifi and Mickey & Greenland reported that the traditional p level of less than 0.05 could fail to identify variables known to be important.³¹⁻³² The model, on the other hand, did fulfill the goodness-of-fit model using the Hosmer–Lemeshow test.

This study was approved by the Ethics Committee of the Universiti Putra Malaysia (JKEUPM Ref. No.: FPSK (EXP16) P072) and the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-16-728-29762). Permission from Jabatan Kesihatan Negeri Melaka and the Medical Officer and Health of Alor Gajah Health District Office was obtained.

Results

A total of 660 women were approached for the study but only 635 gave consent to participate. Five of these were excluded because of incomplete questionnaire, thus leaving a total of 630 respondents for inclusion in the study. The response rate was 95%.

Table 1. Demographic profiles and Lifestyle characteristics of respondents.

Demographic Variables and Lifestyle factors	N = 630	
	n	%
Age		
18–29 years old	256	40.6
30–49 years old	374	59.4
Ethnicity		
Malay	529	84
Chinese	38	6
Indian	58	9.2
Other	5	0.8
Religion		
Muslim	533	84.6
Buddhist	35	5.6
Christian	8	1.3
Hindu	53	8.4
Other	1	0.2
Education		
Never been to school	5	0.8
Primary school	42	6.7
Secondary school	351	55.7
Diploma	125	19.8
Degree	93	14.8
Masters	13	2.1
PhD	1	0.2
Occupation		
Unemployed	205	32.5
Employed	425	67.5
Income		
RM 0–2000	194	30.8
RM 2001–5000	310	49.2
RM 5001–10,000	113	17.9
Above RM 10,000	13	2.1
BMI status (kg/m²)		
<18.5	80	12.7
18.5 – 22.9	176	27.9
>22.9	374	59.4
Smoking status		
No	620	98.4
Yes	10	1.6
Level of physical activity		
Inactive	412	65.4
Minimally active	160	25.4
Highly active	58	9.2
Weight-loss attempts		
Yes	378	60
No	252	40

In this study, the mean age and SD were 32.7 and ± 8.9 years, with a range in age from 18 to 49 years, and 84% of the respondents were Malay. In terms of the level of education, more than three-quarters of the respondents (75.5%, $n = 476$) received up to a secondary level of education, while 67.5% ($n = 425$) were employed part-time or were involved in the private sector or served as government workers. Concerning household income, almost half of the respondents had income between RM 2,001–5,000 (49.2%, $n = 310$). A majority of the respondents were in the overweight/obese group (59.4%, $n = 374$) followed in lower

numbers by those of normal weight (27.9%, $n = 176$) and those who were underweight (12.7%, $n = 80$). The mean BMI of the respondents was $27.1 \text{ kg/m}^2 \pm 6.61$.

Concerning lifestyle factors, 98.4% ($n = 620$) of the respondents did not smoke while approximately 65.4% ($n = 412$) of the respondents had an inactive lifestyle (based on the duration and metabolic equivalent (MET) of physical activity undertaken). However, 60% ($n = 378$) of the respondents reported that they had attempted to reduce their weight in the last year.

Table 2. Weight-loss attempts according to weight status.

Weight status	Weight loss attempts (N = 630)	
	No (n = 252)	Yes (n = 378)
Underweight	48 (96.0%)	2 (4.0%)
Normal weight	93 (69.9%)	40 (30.1%)
Overweight	111 (24.8%)	336 (75.2%)

As shown in Table 2, more than three quarters (75.2%) of overweight or obese respondents attempted to lose weight in the year preceding the study while only four percent of respondents who were underweight had attempted to lose weight. A third of normal weight respondents had also attempted to lose weight.

Table 3. Weight-loss attempts according to weight status.

Items	N = 630	
	n	%
<i>Respondent's perception</i>		
Underweight	80	12.7
About the right weight	176	27.9
Overweight	374	59.4
<i>Estimation (N=141)</i>		
Underestimate	113	80.1
Overestimate	28	19.9
<i>Weight status perception</i>		
Correct perception	489	77.6
Misperception	141	22.4

Table 3 set out the descriptive analysis of body-weight status perception. The results of the study showed that 77.6% of the respondents had an accurate perception while 22.4% had a misperception with regards to their body-weight status. The majority (59.4%) of the respondent perceived that they belonged in the overweight/obese category. More than 80% of the respondents underestimated their weight status.

Table 4. Simple logistic regression of factors associated with bodyweight misperception among reproductive-age women.

Factors	Correct perception n=489 (%)	Misperception n=141 (%)	χ^2	Crude OR	95% CI		p-value
					Lower	Upper	
Age (years)			0.41				
18–29 #	202 (78.9)	54 (21.1)		1			0.520
30–49	287 (76.7)	87 (23.3)		1.13	0.77	1.67	

<i>Ethnicity</i>			0.01				
Malay #	411 (77.7)	118 (22.3)		1			0.918
Non-Malay	78 (77.2)	23 (22.8)		1.03	0.62	1.71	
<i>Level of education</i>			7.75				
Tertiary #	90 (85.7)	15 (14.3)		1			0.020
Secondary	368 (77.0)	110 (23.0)		1.79	1.00	3.22	
Primary	31 (66.0)	16 (34.0)		3.10	1.37	6.99	
<i>Employment status</i>			0.41				
Employed #	333 (78.4)	92 (21.6)		1			0.526
Unemployed	156 (76.1)	49 (23.9)		1.14	0.77	1.69	
<i>Household income</i>			2.22				
≤ RM2000 #	145 (74.7)	49 (25.3)		1			0.538
RM 2001-5000	244 (78.7)	66 (21.3)		0.80	0.52	1.22	
RM5001-10000	91 (80.5)	22 (19.5)		0.72	0.41	1.26	
> RM10000	9 (69.2)	4 (30.8)		1.32	0.39	4.46	
<i>Smoking status</i>			0.90				
No #	480 (77.4)	140 (22.6)		1			0.300
Yes	9 (90.0)	1 (10.0)		0.38	0.050	3.03	
<i>BMI status</i>			1.97				
Underweight #	40 (80.0)	10 (20.0)		1			0.021
Normal weight	91 (68.4)	42 (31.6)		1.85	0.84	4.04	
Overweight	358 (80.1)	89 (19.9)		0.99	0.48	2.07	
<i>Physical activity</i>			3.04				
Highly active #	45 (77.6)	13 (22.4)		1			0.206
Minimally active	132 (82.5)	28 (17.5)		0.73	0.35	1.54	
Inactive	312 (75.7)	100 (24.3)		1.11	0.58	2.14	
<i>Weight-loss attempts</i>			11.79				
Yes #	311 (82.3)	67 (17.7)		1			0.001
No	178 (70.6)	74 (29.4)		1.93	1.32	2.82	

Reference group

OR = Odds Ratio

CI = Confidence Interval

Univariate analysis was conducted to assess the presence of an association and to identify factors associated with body-weight status misperception among reproductive-age women as set out in Table 4. From Simple logistic regression (SLR) analysis, out of all the factors, only three were noted to have a significant association with body weight misperception; the level of education ($p = 0.020$), BMI status ($p = 0.021$) as well as weight loss attempts ($p = 0.001$).

Women who had a lower education level were at risk of body weight misperception. Women who had only primary education had approximately three times likelihood of having body weight misperception (crude OR: 3.10, 95% CI: 1.37–6.99) while women who received secondary education had no significant difference of having body weight misperception (crude OR: 1.79, 95% CI:

1.00–3.22) compared those who had tertiary education. When it comes to BMI status, women who were normal weight have almost twice the likelihood of misperceiving their body weight compared to underweight women (crude OR: 1.85, 95% CI: 0.84 – 4.04, $p = 0.021$). Similarly, women who had never attempted to lose weight for the last year had an approximately doubled risk of having body weight misperception compared to the counterpart (crude OR: 1.93, 95% CI: 1.32–2.82, $p = 0.001$). There was no significant difference with regards to age, ethnicity, employment status, household income, smoking status, and physical activity between correct perception and misperception of body weight among reproductive-age women ($p > 0.05$). However, all the significant factors had a weak effect on body weight misperception as showed by the Phi and Cramer's V values of less than 0.3.

Since only a few factors showed an association with body weight misperception, the researcher decided to select factors that have $p < 0.3$ to be put into the subsequent multiple logistic regression (MLR). The p -value was set larger to allow for more important variables to be included in the model³⁰ since the value of less than 0.05 could potentially miss in recognizing variables known to be important.³¹⁻³² So, the factors that were analysed in MLR were level of education ($p = 0.02$), smoking status ($p = 0.300$), BMI status ($p = 0.021$), physical activity ($p = 0.206$) and weight loss attempts ($p = 0.001$).

Table 5. Multiple logistic regression of the associated factors of body weight misperception among reproductive-age women

Factors	B	SE	<i>p</i> -value	Adjusted OR	95% CI	
					Lower	Upper
<i>Level of education</i>						
Tertiary #				1		
Secondary	0.659	0.304	0.030	1.93	1.07	3.31
Primary	1.266	0.429	0.003	3.55	1.53	8.22
<i>Smoking status</i>						
No #	-			1		
Yes	1.076	1.089	0.323	0.34	0.40	2.89
<i>BMI status</i>						
Underweight #				1		
Normal weight	0.754	0.407	0.064	2.13	0.96	4.73
Overweight	0.366	0.406	0.368	1.44	0.65	3.19
<i>Physical activity</i>						
Highly active #	-			1		
Minimally active	0.286	0.388	0.460	0.75	0.35	1.61
Inactive	0.056	0.348	0.872	1.06	0.54	2.09
<i>Weight-loss attempts</i>						
Yes #				1		
No	0.615	0.223	0.006	1.85	1.20	2.87

$p < 0.05$ = significant

Reference group B = Beta coefficient

SE = Standard error

OR = Odds Ratio

CI = Confidence Interval

Table 5 sets out the multivariate analysis using MLR to determine the predictors for bodyweight misperception. The Omnibus Test of Model Coefficients for logistic regression analysis was statistically significant, χ^2 (df: 8, $N = 630$) = 28.343, $p < 0.05$, Nagelkerke R^2 : 0.067. The model was 77.6% accurate in its prediction of body weight misperception. The Hosmer–Lemeshow test (for goodness-of-fit) showed that the data was a good fit for the model, χ^2 (df: 6, $N = 630$) = 8.603, p : 0.197. The findings indicated that a lower level of education was a significant predictor of body weight misperception among reproductive-age women. After adjusting the other factors, women with a primary level of education were 3.5 times more likely to misperceive their body weight compared to those with tertiary-level education (adjusted OR: 3.545, 95% CI:

1.530–8.215, $p = 0.003$) whereas women who received a secondary level of education had a 1.9 time greater likelihood of misperceiving body weight compared to those with tertiary-level education (adjusted OR: 1.93, 95% CI: 1.07–3.31, $p = 0.030$). Having no weight-loss attempts was amongst the significant predictors of body weight misperception (adjusted OR: 1.85, 95% CI: 1.20–2.87, $p = 0.006$). Although BMI status showed an association with body weight misperception in SLR analysis, it had lost its significance once all other factors were controlled. Other variables such as smoking status and level of physical activity did not appear significantly to influence the probability of body weight misperception among reproductive-age women.

Discussion

More than one fifth (22.4%) of the respondents in this study had body weight misperception. Among those with weight misperception, more than 80% of the respondents have underestimated their weight status. The multivariate analysis indicated that the level of education played a significant role in determining body weight misperception. Those with lower levels of education had a higher risk of misperceiving body weight. Furthermore, not having attempted weight loss for the preceding year was found to be a significant factor associated with bodyweight misperception.

In this study, most women who misperceived their weight tended to underestimate their weight status. This is consistent with another local study among adults that reported a significantly higher risk of underestimation of weight status among women aged between 25 and 54, which is the age group most similar to that in our study.³³ In other local studies among adolescent and university students, however, most reported a higher likelihood of women overestimating their body weight.^{21,34-35} In planning interventions for weight management, therefore, health-care professionals in primary care may need to take into consideration the age group of the women because interventions for underestimation of body-weight status differ from those for overestimation.

From our multivariate analysis, the level of education played a significant role in determining body weight misperception. A lower level of education was associated with a higher risk of having body weight misperception (both under and overestimation). This was a similar finding to those reported in previous studies.³⁶⁻³⁷ Their analyses showed women with less education had significantly higher odds of weight status misperception than their more educated counterparts. A local study by Shagar et al. also suggested a similar pattern (OR: 3.73, 95% CI: 1.93 – 7.18).²¹ However, that study was looking at the mothers' level of education because its respondents were among university students. Although Shagar et al. were looking at the education level of the mothers of the study respondents, that a home context of a lower level of education could lead to misperception of weight status was reasonably true. On the contrary, a study by Bhanji et

al. found no significant association between weight status misperception and education level.³⁸ These findings were likely contradictory because of the age of the respondents – the respondents in Bhanji et al. study were in a younger age group (18 years and above). Also, the fact that Bhanji et al. only compared overweight and obese participants in Pakistan means their findings are not comparable to those here.

As was expected, not having undertaken weight loss attempts for the preceding one year was found to be a significant factor associated with bodyweight misperception. In our study, reproductive-aged women who had made no attempts to lose weight in that year had almost double the risk (OR: 1.85, 95% CI: 1.195 – 2.865) of having body weight misperception as compared to those who had made such attempts. This finding contradicts the many studies which reported that weight perception could influence weight-loss behavior.³⁹⁻⁴² For instance, a study by Bhurtun & Jeewon reported that the vast majority of respondents (88.5%) who were involved in weight-loss behaviors overestimated their weight status.⁴² This means that a vicious cycle could potentially develop since weight-status perception could influence weight-loss behavior and vice versa. The difference in the findings in our study could be due to the difference in the study age group. The study by Lemon et al.³⁹ included participants from a wide age range (18–65 years old) and other studies⁴⁰⁻⁴² involved only teenagers and university students. In our study, more than 80% of the respondents have underestimated their weight status compared to the other studies which reported the association of weight loss attempts with weight status overestimation.³⁹⁻⁴² This observation is significant for women of reproductive age in the context of applied clinical settings concerning providing lifestyle consultation. Having no history of weight loss attempts makes these women more likely to under-estimate their weight status, which might preclude them from following a healthy lifestyle.

BMI status was associated with bodyweight misperception according to a study by Dorosty et al.,³⁶ that reported participants with normal weight/BMI had significantly higher weight misperception (OR: 8.16, 95% CI: 4.82 – 13.82) than their overweight/obese counterparts.³⁶ This study, however, only showed an association with BMI status in a univariate analysis and it did not remain significant at the multivariate level. These

incongruent findings may be due to the influence of cultural standards concerning desired body shape as the latter study was conducted among a Western population rather than an Asian population as was the case here.^{19,43} This study population also had the lowest percentage of those identifying as belonging to a Chinese ethnic group and the majority were Malay. This may be another explanation for the insignificant association of BMI with a misperception of body-weight status as, according to national health and morbidity surveys, Malays and Indians have a higher rate of obesity.⁴⁴ Again, the influence of cultural standards concerning desired body shape among these ethnic groups may have contributed to the difference.

With regards to the practice of a healthy lifestyle by the study participants, the number of inactive respondents exceeded the number of respondents who attempted weight loss. This may be because the respondents who attempted to lose weight may not have practiced an active lifestyle despite trying to lose weight. A local study by Kuan et al. revealed that some females reported practicing self-induced vomiting and taking laxatives as their method of weight reduction, which are not medically recommended.³⁵ However, we should not assume that this method was practiced by the respondents in this study since that aspect was not explored. Women tend to be less active than men and the prevalence of physical activity among women was low.⁴⁵⁻⁴⁸ Results here indicate a similar pattern with 65.4% of respondents not meeting the international recommendations for physical activity. Furthermore, there was no significant association in this study between body-weight status misperception and level of physical activity. This finding did not correlate with the results of the study by Miller et al. which suggested that a sedentary lifestyle was a significant predicting factor among underweight women for overestimating their weight status (OR: 1.63, 95% CI: 1.03–2.57) but a protective factor for the overweight group from underestimating their weight (OR: 0.58, 95% CI: 0.45–0.73).⁴⁹ Again, this difference could be explained by the variable of the respondents' social and cultural backgrounds.

This study has highlighted the clinical-practice implications in primary care for screening and weight management of reproductive-age women. More women at reproductive age underestimate their body weight status. Also, those with a low level of education and those

who had no weight loss attempts have a high risk of body weight misperception. In routine clinical practice, and especially, in maternal and child health clinics, primary healthcare providers may, therefore, need to identify and screen reproductive-aged women who are at risk of misperceiving their weight status and counsel these women on weight management. This will eventually reduce the risk of developing obesity-related consequences such as diabetes and hypertension among women of reproductive age either at their current stage or in later life.

One of the strengths of this study is that it is one of a few studies conducted among reproductive-age women concerning factors associated with body weight status misperception and can thus serve as baseline information on weight-status misperception among women in this age group in Malaysia. Furthermore, this study had a relatively large sample size and to avoid error or bias, used measured, rather than self-reported, height, and weight for BMI calculation.

There are few limitations noted in this study. Since this is a cross-sectional study, the data could not be used to analyse behavior over a period and the findings could not help the researcher to determine the true cause and effect of misperception. Also, universal sampling and the timing of the data collection was not guaranteed to be representative of the population. Due to the small sample of participants who overestimated their weight status we were unable to analyze the misperception of weight separately for those underestimating and those overestimating their weight status. Interventions might be different for these two groups of participants. Lastly, a third of normal-weight respondents had attempted to lose weight. This could be because this group of participants might have managed to lose weight during the preceding year and were, at the time of the study, in the normal-weight category. We did not, however, explore this information further as the question on weight loss attempt was just one question and trying to elicit any attempt to lose weight. We did not collect data on the method and duration of weight-loss attempts and or of prior weight before such attempts.

Conclusion

The proportion of weight misperception among women of reproductive age was 22.4%. A low level of education was a significant predictor of misperception of weight. The lower the level,

the greater risk they had of misperceiving their weight. Other than that, having not attempted weight loss was the other significant risk factor related to the body-weight misperception among reproductive-aged women. This study's data may serve as a resource to identify women in this age group who are at risk of misperceiving their weight status to counsel them in the benefit of adopting healthy living, including recommending being active. In routine clinical practice, primary healthcare providers may need to identify and screen reproductive-aged women who are at risk of misperceiving their weight status and counsel these women on weight management. This will eventually reduce the risk of their developing obesity-related consequences such as diabetes and hypertension whether at their current stage or in later life. Furthermore, future research

could examine the relationship between bodyweight misperception and other important aspects such as psychological factors and eating habits.

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Conflict of Interest

The authors declare no conflict of interest

How does this paper make a difference to general practice?

- Bodyweight status misperception among reproductive-aged women was associated with a low level of education and with those who had made no weight-loss attempts.
- Primary healthcare providers may be able to make use of these findings to identify reproductive-aged women who are at risk of misperceiving their weight status and counsel these women on weight management.

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Orbital Metastasis as The Initial Presentation of Breast Cancer

Muhd H, Zuhaimy H, Ismail MF, Arshad F, Azmi SNM, Sahak NH

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Introduction

Breast cancer is the most common cancer among the female population of Malaysia, with an average lifetime risk of 31.1%.¹ Typical sites for metastasis of the breast carcinoma include the bones, liver, lungs, skin, and brain. In most cases, breast cancer is diagnosed first, but in 12–31% of the cases like in this case, the metastasis appear first as the initial presentation. In this case, we reported a case of a healthy young woman who presented with orbital metastasis as the initial presentation of breast cancer.

Methods

See case report.

Results

A 32-year-old married woman who was a passive smoker for the past six years presented at an ophthalmology clinic with a sudden onset of binocular horizontal diplopia for two days. This condition was associated with increased fullness of the right upper and lower eyelids and conjunctival redness for 3 months. She also complained of having had intermittent generalized headaches for the past three months. However, she denied any vomiting, seizures, limb weakness, or constitutional symptoms. Her other systemic symptoms

were unremarkable. She has 4 children and a significant positive family history of cancer; her grandfather and grandmother died of liver carcinoma and colon carcinoma, respectively.

Ocular examination showed visual acuity of 6/9 in each eye, with no relative afferent pupillary defect noted. There was a 2 cm x 4 cm x 3 cm non-tender mass with a firm, irregular border above the right lower eyelid and displaying fullness and erythematous medial canthal of the right upper eyelid. No proptosis or bruit was identified. Extraocular movement in the right eye was limited in all directions, while the left eye had limited abduction (**Figure 1**). Anterior segment examination showed nasally dilated episcleral vessels in both eyes. Intraocular pressure was high for both eyes. Dilated fundal examination showed bilateral optic disc swelling with normal macula and absence of retinitis, choroiditis, or vasculitis. The patient's treatment began with maximal topical antiglaucoma eyedrops.

A complete physical examination revealed peau d'orange skin changes in the breasts with an underlying 2-cm irregular mass in the retroareolar region of the left breast. An enlarged nontender Virchow's node was also palpable. The results of other systemic examinations were unremarkable.



Figure 1: Images show there is a limitation of extraocular movements in all 9 cardinal gazes in the right eye with limitation of abduction in the left eye.

Mammography identified an irregular, high-density mass over the bilateral subareolar area. Contrasted enhanced computed tomography (CECT) of the brain, orbit, thorax, abdomen, and pelvis showed bilateral infiltrative lesions within both the orbital floors and the brain, in keeping with metastases (**Figure 2**). In

addition, a bilateral heterogeneous mass was revealed within the breast parenchyma with thickening of the overlying skin, as well as an irregular heterogeneous lesion in segment IVa/VIII of the liver and periaampullary region (**Figures 3 and 4**).

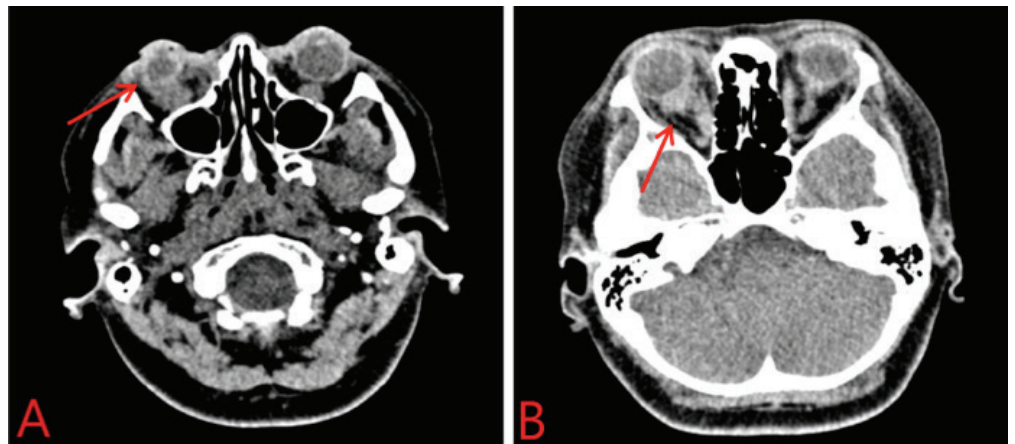


Figure 2: CT scan imaging of the orbit: Axial view A) and B) images showed retro-orbital mass bilaterally, which was worse on the right side. The right extraocular area is filled up with an enhancing soft tissue mass (red arrow).

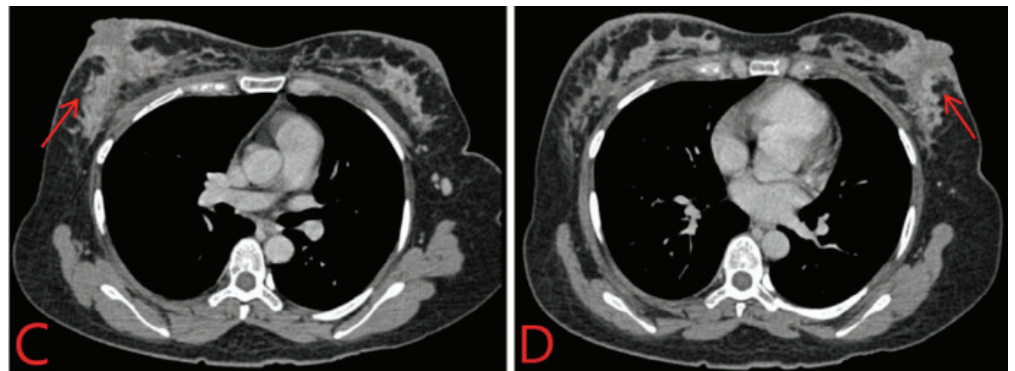


Figure 3: . CT imaging of thorax: Axial view C) and D) images demonstrated bilateral mass at the retroareolar areas of the breast with subcutaneous thickening at the periareolar area (Red arrows).

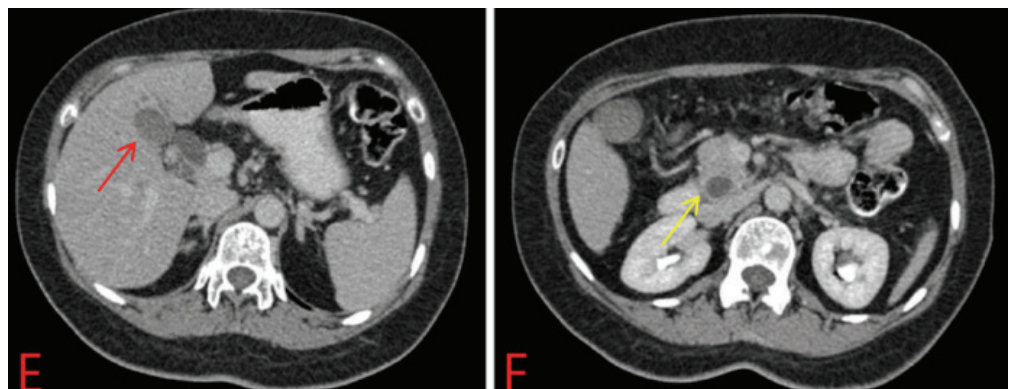


Figure 4: CT imaging of abdomen: Axial view E) Images showed an irregular heterogenous hypodense metastatic lesion in segment IVa/VIII (red arrow) and F) periampullary region (yellow arrow).

She was referred to the oculoplastic team for an orbital biopsy. Histopathological examination of the right orbital floor (**Figure 5**) lesion and the breast tissue biopsy yielded results compatible with breast cancer metastasis in the orbit. Immunohistochemistry analysis confirmed that the primary tumor originated in the breast. Therefore, this discovery was followed by a definitive diagnosis of infiltrative lobular breast carcinoma with disseminated metastases.

The patient's care was subsequently co-managed by both the oncology and surgical teams. Palliative chemotherapy and radiation therapy were commenced before planned surgery. Unfortunately, however, the patient died three months after the diagnosis was made.

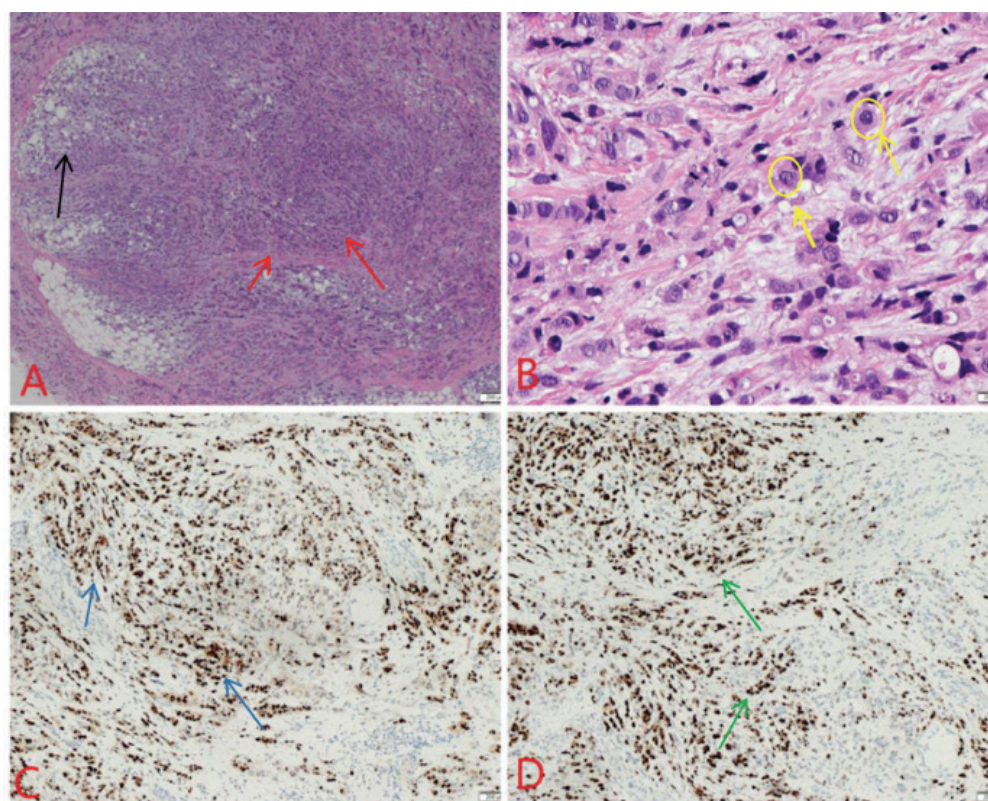


Figure 5: Left orbital tissue biopsy specimen: A) demonstrated malignant cells arranged predominantly in cords, infiltrated the fatty tissue (red arrow). B) Malignant cells are moderately pleomorphic, having hyperchromatic to vesicular nucleus, inconspicuous nucleoli and moderate amount of cytoplasm. (yellow arrow) C) 60% of tumour cells PR positive. D) (green arrow) 70% of tumour cells ER positive. (blue arrow)

Discussion

The incidence of metastasis of the orbit in a patient with systemic malignancy has been reported to vary between 2 and 3%.^{2,3} Metastatic breast carcinoma is considered the most common primary tumor to metastasize in the orbital region, accounting for 55–60% of cases, followed by lung carcinoma (16%–20%), cutaneous melanoma (4.5%), prostate carcinoma (3.6%), and gastrointestinal carcinoma (3.6%).^{4,6}

Orbital metastases can display a variety of clinical presentations. Based on a case series by Ahmad et al., diplopia (48%), proptosis (26%), pain (19%), decreased vision (16%), ptosis (10%), and palpable orbital mass were among this condition's most common symptoms.⁷ In our case, the patient presented with subacute onset of diplopia with underlying gradual onset of a right orbital mass.

Although the majority of orbital metastasis have been found in patients with known diagnoses of breast cancer, a small percentage of cases (12–31%), including our case, this same metastasis

was found before breast cancer had been diagnosed. Thus, with the absence of a primary carcinoma diagnosis, finding metastatic diseases presents a challenge. Furthermore, Ferry et al. found that the latency period between primary carcinoma and orbital metastasis may range from 4 to 6.5 years.¹⁰

Diagnosing metastatic disease requires a high index of clinical suspicion. In our case, the patient presented with an orbital mass, and the etiology varied from non-infective to infective causes. Possible differential diagnoses could include thyroid eye disease, carotid–cavernous fistula, orbital cellulitis, lymphoproliferative disorder (lymphoma), and idiopathic orbital inflammatory disease. Most orbital metastases will produce a motility deficit, pain, and/or impaired vision in comparison with benign lesions, which are usually asymptomatic or progress slowly.¹¹ Differentiating orbital metastasis from other differential diagnosis can be made by doing a thorough history taking and physical examination. In our case, the presence of a strong family history of cancer, in addition to the detection of a palpable retro-areolar mass in the patient's left breast, strongly pointed

to malignancy as the primary source of her complaints.

Imaging of the orbital lesion will also aid in determining whether a mass is malignant or benign. Metastatic lesions are more likely to involve the anterior orbital rather than the posterior orbit, as well as bone or extraocular muscles.³ Our patient's imaging of the orbit revealed the presence of an ill-defined mass arising from the right retroconal region, with involvement of the right medial and inferior rectus, which are associated with left extraocular muscle involvement.

The majority of metastases to the orbit do not need to be biopsied, especially in patients known to have metastatic disease. However, in instances of solitary metastasis to the orbit in patients with no identifiable metastatic disease elsewhere, tissue biopsy is crucial for definitive diagnosis only if it accessible.¹¹

Following the diagnosis of infiltrative lobular breast carcinoma stage IV with metastases to the brain, our patient was subjected to palliative care treatment. The aims of palliative care are to improve quality of life, to provide comfort, and to help preserve vision. Palliative care treatment for metastatic breast cancer includes radiotherapy, chemotherapy, and hormonal therapy. Radiotherapy has become the primary treatment for orbital metastases,

showing a high objective response rate with symptoms improvement in 80% of cases and vision restoration in some cases.¹²⁻¹³ However, chemotherapy is needed in cases of systemic disease.¹⁴

Extensive orbital surgery such as enucleation is not recommended, since is not curative and is related to high ocular morbidity. However, such procedures may be used in cases involving intractable ocular pain or unmanageable local hygiene. The prognosis for this condition is rather poor, with a median survival rate of 22–31 months following the diagnosis of orbital metastasis.^{7,14} Unfortunately, our patient succumbed to the disease three months after the diagnosis, which was much sooner than deaths reported in existing literature.

Conclusion

Despite increased breast cancer awareness and advancement in technology for early breast cancer diagnosis, a small percentage of patients still present with metastatic signs and symptoms of advanced stages of breast cancer. This case illustrated that undiagnosed metastatic breast carcinoma can initially present with orbital symptoms. Hence, in the presence of slow-growing orbital pathology and a strong family history of cancer in a female patient, a detailed systemic examination of the breasts especially is necessary for establishing the diagnosis.

How does this paper recommend changes to general practitioners (GPs)?

- Painless orbital swelling in a patient should prompt the GPs to collect a detailed medical history and to perform a physical examination.
- GPs have a key role in cancer detection, since they are the first point of contact for patients with possible cancer symptoms or signs. Once malignancy is suspected, an early referral to an ophthalmologist should be made.
- GPs should emphasize the importance of regular surveillance of breast cancer symptoms or signs in patients with risk factors at a primary level (e.g., yearly mammograms and breast self-examinations).

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Lo, the ever confounding nipple shadow!

Boo WH, Chan YC

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Abstract

The discovery of a solitary pulmonary nodule (SPN) on chest imaging can be alarming for both the clinician and the patient. In the absence of a uniform guideline, managing SPN is nothing short of challenging for primary care physicians (PCPs). We present a case here of a patient presenting with prolonged cough who also displayed unilateral SPN on her chest radiograph. Through further examination, this presence was later shown to be a nipple shadow simulating SPN, and the patient was spared unnecessary testing and psychological distress.

Introduction

An SPN is defined as a rounded opacity measuring up to 3 cm in diameter which may be either poorly or well-defined and is completely surrounded by pulmonary parenchyma in the absence of atelectasis, lymphadenopathy, or pleural changes.^{1,2} Frequently, an SPN is first detected via plain chest radiography.³ Published data in the 1950s suggested that the frequency of detecting an SPN was about 1 in every 500 to 1,000 chest radiographs performed in United States (US), depending on the population studied.^{4,6} A more recent study involving 1,000 asymptomatic subjects with an increased risk of lung cancer noted that almost 6% of participants had non-calcified SPNs when screened with a chest X-ray (CXR) versus 16% screened with a chest CT.⁷ Fortunately, most SPNs are of benign pathology.²

Case Report

A 37-year-old Malay woman presented with the chief complaint of intermittent dry cough for more than 2 months, which was notably worse when she lay in bed to sleep. Additionally, she complained of acid regurgitation and water brash. The cough was not accompanied by fever, loss of weight or appetite, night sweats, or hemoptysis. She also denied any pulmonary tuberculosis exposure or smoking history. Her medical history included underlying depression, which had been treated with oral fluoxetine, and cervical myelopathy. There was no family history of atopy, though she did have a strong family history of malignancy; her father had been diagnosed with nasopharyngeal carcinoma, her uncle had lymphoma, and her aunt had breast cancer. Physical examinations revealed the patient to be overweight but with normal vitals. Precordial, respiratory, and abdominal

examinations were all unremarkable. Finally, no lymphadenopathy was present.

Her initial CXR revealed a small (about 2.5 cm), well-defined lesion with a vague medial border over the lower zone of the left lung (refer to **Figure 1**). A subsequent repeated image with nipple markers, however, showed clear lung fields, which confirmed that the opacity was likely a nipple shadow (refer to **Figure 2**). The patient was later treated for gastroesophageal reflux disease with a combination of oral proton-pump inhibitors and a prokinetic agent. In addition, she was advised regarding useful lifestyle and dietary changes. Her symptoms improved remarkably after 4 weeks of treatment.



Figure 1: CXR in posteroanterior view without nipple markers

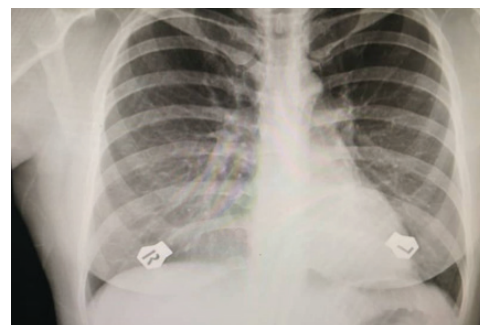


Figure 2: CXR in posteroanterior view with nipple markers in situ

Discussion

An SPN poses a great conundrum, since the underlying causes are legion, ranging from benign findings to early malignancies, which require urgent intervention (refer to **Figure 3**).^{2,8} The ideal approach to treating SPNs is still unknown because of a lack of quality evidence to indicate best practice.^{2,9} Not surprisingly, a U.S. study has shown that almost half of the PCPs surveyed reported a lack of confidence in managing their SPNs, while 3 out of 4 were inclined to refer to pulmonologists for further evaluation.¹⁰ The general first rule in approaching an SPN is to evaluate the patient's risk of malignancy.^{2,11} In recent years, several computational prediction models have been proposed to quantify the risk of SPN malignancy.^{12,13} The bedside use of such cumbersome models, however, remains limited. As such, most clinicians still depend on clinical judgment to determine SPN risk.^{11,12} The criteria associated with greater malignancy risk include clinical factors such as older age, being a smoker, a personal or family history of cancer with radiological features involving larger nodules, upper lobe SPN location, and the presence of spiculation or ill-defined edges.¹²

An SPN patient with a low risk of malignancy still warrants judicious deliberation of

probable benign causes. This is important to avoid needless testing, which creates not only financial cost but also unnecessary apprehension in patients, all of which would be worsened in the event of false positive results. In cases like this one, in which a nipple shadow simulates an SPN, clinicians should always consider the possibility of artifacts. This is particularly important considering that in a series of 1,000 routine CXRs, nipple shadows were detected about 10% of the time.¹⁴

Radiographic results potentially indicative of nipple shadows may include bilateral symmetrical lesions, asymmetrical lower zone lesions, lesions appropriately positioned in relation to breast shadows, and any lesion with a sharp lateral border but a vague medial outline.¹⁴⁻¹⁷ An important caveat to remember is that nipple shadows are not infrequently noted in male patients as well.^{14,18}

When confronted with the possibility of nipple shadows, another CXR in the oblique view or with the use of nipple markers is often adequate to confirm the diagnosis.^{15,16} It is prudent, however, to keep in mind that in extremely rare cases, an SPN may superimposed on a nipple shadow.¹⁹⁻²¹

Type	Etiology
Infections	Tuberculosis Atypical mycobacteria Round pneumonia Lung abscess Fungus: aspergillosis, blastomycosis, cryptococcosis, histoplasmosis, coccidioidomycosis Parasites: amoebiasis, echinococcosis Measles Nocardia Pneumocystis jiroveci
Neoplastic (Benign)	Mesenchymal tumors: hemangioma, lipoma, chondroma, fibroma Pulmonary hamartoma Neural tumors: schwannoma, neurofibroma, paraganglioma Sclerosing pneumocytoma Plasma cell granuloma Endometriosis
Neoplastic (Malignancy)	Lung cancer Solitary metastasis Neuroendocrine tumors Malignant teratoma
Vascular	Haematoma Arteriovenous malformation Pulmonary artery aneurysm Pulmonary venous varix Lung infarct

Congenital	Bronchogenic cyst Lung sequestration
Inflammatory	Rheumatoid nodules Sarcoidosis Granulomatosis with polyangiitis Microscopic polyangiitis
Lymphatic	Intrapulmonary lymph node Lymphoma
Miscellaneous	Nipple shadow Round atelectasis Lipoid pneumonia Amyloidosis Mucoid impaction Focal scar

Figure 3: Common etiologies of SPNs^{2,8}

Conclusion

Although only a small fraction of SPNs are malignant, PCPs should remain mindful that the foremost step in approaching an SPN is to evaluate the risk for malignancy. It is paramount to consider the wide-ranging benign causes in low-risk patients, particularly the possibility of a nipple shadow masquerading as an SPN, in order to minimize harm and to provide the best outcome for the patient.

Conflict of interest

The authors declare that there are no conflicts of interest.

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Contribution of authors

Woi Hon Boo and Yuen Ching Chan diagnosed and treated the patient. Woi Hon Boo conceived the study. Both participated in the interpretation and drafted the manuscript.

How does this paper recommend changes to general practitioners (GPs)?

- Underscores the importance of assessment of malignancy risk by considering both clinical findings and radiological features in the initial management of SPN.
- Highlights the need for comprehensive evaluation of the probable benign causes of SPN in low-risk patients to avoid unnecessary harm.

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Cryotherapy: A Successful Monotherapy for Earlobe Keloids

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Abstract

A keloid represents an excessive overgrowth of skin beyond the boundaries of an injury. Earlobe keloids usually follow ear piercing and can become large, sometimes producing remarkable disfigurement. Surgical excision, pressure dressing, intralesional corticosteroid injection, cryosurgery, radiation, and lasers have all been used to treat earlobe keloids. However, none has produced uniformly satisfactory results. Combinations of more than one modality have also been employed to yield successful outcomes. We describe cryotherapy as a single modality to treat seven-year-old, multiple earlobe keloids. Three cryotherapy sessions with two freezing-thawing cycles of 30–40 seconds' freezing time and two minutes' thawing time, undertaken one month apart, resulted in complete flatness of the keloids and no recurrence after 5 years. We also evaluate keloid-related and operational factors that determine the success of cryotherapy as a monotherapy for earlobe keloids.

Introduction

A keloid is an overgrowth of skin at a site of injury, surgical scar, burn or vaccination.^{1,2} Predisposing factors include black race; female gender; family history of keloid formation; secondarily infected wound;³ injuries to the presternal area, earlobes, shoulder girdle, face or ankle;⁴ and injury during puberty or pregnancy, due to high fibroblastic activity.⁵ Itching and pain are common symptoms of keloids.^{1,3} Keloids can become of major cosmetic concern, particularly earlobe keloids if they grow to a large size. Earlobe keloids usually follow ear piercing.⁶ Different treatment modalities have been employed, whether alone or in combination, including surgical excision, pressure dressing, intralesional corticosteroid injection, cryosurgery, radiation, and lasers, yet none of these options has consistently produced satisfactory results.^{6–8} Cryotherapy is widely and safely used in dermatology: for instance, in the treatment of cutaneous leishmaniasis,⁹ warts¹⁰ and benign tumors such as pyogenic granuloma.¹¹ The use of cryotherapy alone was studied, and was found to be a promisingly effective and efficient method for treating earlobe keloids,^{8,12,13} especially for small keloids less than 0.6 cm⁸, and of less than 2 years' duration.^{1,3,14} We here describe multiple, seven-year-old earlobe keloids on both ears, which we successfully treated with cryotherapy alone. We selected the reduction in thickness and recurrence as indicators of improvement.

Case report:

A 20-year-old woman had a seven-year history of asymptomatic keloids on both earlobes, which had appeared a few weeks after piercing. Examination of the left earlobe revealed a skin-colored, soft, single, pedunculated keloid of 2 x 1.5 cm size and 0.8 mm thickness on the anterior surface. On the right lobe, there was a purple-colored, soft, single, sessile, 2 x 1 cm-sized keloid on the anterior surface, and three small, sessile nodules less than 0.5 cm in diameter on the posterior surface. We used a direct open spray technique and liquid nitrogen cryogen (LN) to treat all the keloids. LN from a Brymill (CRY-AC no. 593) cryogun, with nozzle size (B), set at 1 cm distance from the center of the keloid surface was sprayed on the lesion for 30–40 seconds, for two freeze-thaw cycles with two minutes' thawing time, until we achieved a snowball covering the whole keloid. To protect the surrounding normal skin, we used a Brymill open cone shield that covered the whole field except the targeted keloid. The treatment was well tolerated by the patient; no local anesthesia was required. Fucidin cream was applied twice a day after the session to prevent secondary infection. An inflammatory reaction appeared two days after the session and helped in the destruction of 50% of the keloid. A second and third session were subsequently held, after the signs of inflammation resolved. A total of three cryotherapy sessions, each one month apart, involving two freeze-thaw cycles of 30–40 seconds' freezing time were required

before the left earlobe keloid became completely flat (100% thickness reduction) (**Figure 1**). The keloids on the right ear also required three cryotherapy sessions, with two freeze-thaw cycles each session of 20-30 second' freezing time and 2 minutes' thawing. After the three sessions, there was 100% thickness reduction on the right-earlobe keloids, with mild induration only felt by deep palpation of the posterior surface of the earlobe (**Figure 2**). At a 5-year follow-up, there remained mild hypopigmentation, but no scarring and no recurrence.



Figure 1: (Left earlobe keloid): a) Before cryotherapy, b) During the 1st session, c) Bullous inflammation 2 days after 1st session, d) complete flatness of the keloid 5 months after the last 3rd cryotherapy session.

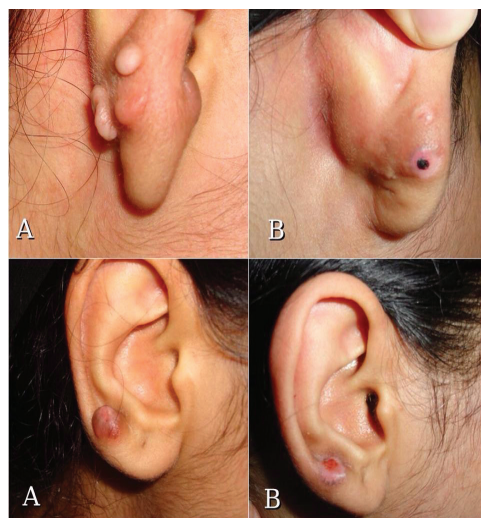


Figure 2: (Right earlobe keloid): Anterior: a) Before cryotherapy, b) 3 weeks after 3rd session. Posterior: a) before cryotherapy, b) 3 weeks after 3rd session.

Discussion

Cryotherapy alone has been reported by some studies to be effective in treating earlobe keloids. Keloid-related factors and operational factors are significant determinants for the success of cryotherapy. Cryotherapy is more effective when keloids are small and recent. In our case, although the earlobe keloid was both old and of considerable size, we were able to achieve a 100% reduction in thickness. This can be explained by operational factors that we considered during therapy, such as the cryogen used, freezing rate, freezing temperature achieved by the cryogen, freezing time (FT),¹⁵ freeze-thaw cycle (FTC), and thawing time.¹⁶ We used the cryogen liquid nitrogen because it is the coldest cryogen and creates high freezing temperatures, between -25 to -50, in 30 seconds,¹⁶ which can destroy the keloid tissue. To achieve a high freezing rate, we used the open spray method (OS) and techniques recommended by Andrews for family physicians.¹⁶ Accordingly, for keloids, the recommended method for cryogen application are either the open spray (OS) or the probe method, with FT for 20-30 seconds, one FTC, and 3 subsequent treatment sessions 8 weeks apart. However, in our case the FT was longer (between 30- 40 seconds), and we used more than one FTC: we used 2 FTC, with 2 minutes' thawing time in each session, and the time between subsequent sessions was only 4 weeks. There is evidence from the literature that lengthy application of the cryogen produces significant reduction in the thickness of the keloid.¹⁵ The quick-spraying application using the OS method, the longer FT, and the very slow thawing time that we applied during treatment were successful operational dimensions for inducing the sufficient tissue destruction necessary to flatten the keloids.

Our results are consistent with those of Zouboulis et al. 1996, where cryotherapy alone reduced the thickness of keloids after three cryosurgery sessions, involving one freeze-thaw cycle of 30 seconds per session per lesion, one month apart. For patients refusing cryotherapy, other treatment modalities for earlobe keloids include the combination of more than two treatment modalities, such as surgical excision and corticosteroid injection,¹⁷ but there is a 55% chance of recurrence after the keloids are excised.¹⁷ In the trial of Aköz, et al. 2003, earlobe keloids were surgically excised, followed by intralesional triamcinolone injection; finally, pressure over the wounds was applied

using silicon-coated ear-ring sheets covered for four months after the keloid excision. This combination of four methods produced a 90% success rate, with only one recurrent case. It stands as a promising approach; however, it is costly, and produces considerable discomfort to the patient, as the silicone gel sheet is intended to be applied for at least 3–4 months. Another surgical innovation for treating earlobe keloids is the “keloid fillet flap,” which does not need to be combined with steroid injection or compression, but which requires surgical skill including dissecting and removing the keloid from the overlying skin that will act as the

“flap” used to cover the wound after removing the keloid.¹⁸

In contrast, cryotherapy is cheaper, easily applied, and does not require sophisticated preparation. All these factors make cryotherapy a cost-effective procedure for treating keloids.

In conclusion, cryotherapy appears to be a promising, effective, efficient, easy-to-perform and safe single approach to treat keloids.

No conflict of interest declared. No funding was received for this work.

How does this paper make a difference to general practice?

- Cryotherapy can be used exclusively for treating earlobe keloids
- No need for compression using silicone sheet
- Cryotherapy is cost-effective if applied properly, by applying the appropriate freezing and thawing time and appropriate number of freeze-thaw cycles every session

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A Case of Severe *Falciparum* Malaria in a Returned Traveler

Low QJ, Lau WK, Lim TH, Lee RA, Cheo SW

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Abstract

Primary care providers should be alert to travel-related infections. Around 10–40% of returning travelers from all destinations and 15–70% of travelers from tropical settings experience ill health, either overseas or upon returning home.¹ A systematic approach concentrating on possible infections should be undertaken based on the patient's travel location, immunization history, presence of malaria chemoprophylaxis at the destination, other potential exposures, incubation period, and clinical presentation.^{2–3} The World Health Organization (WHO) website is constantly being updated on specific travel-related infections and recent geographical outbreaks. In this paper, we report a case of severe *falciparum* malaria in a returned traveler.

Introduction

Traveling overseas is much easier and more affordable today than it once was with the rise of budget airlines across the world. An estimated 11.9 million international outbound trips from Malaysia were recorded in 2016, and that number is predicted to grow by an average of 3.5% annually to around 14.1 million trips by 2021.¹ This statistic ranked Malaysia as the sixth highest among emerging markets. Of course, the rise of international travel has also brought a rise in travel-related infections. Fever is a common presentation of infection, with gastrointestinal and respiratory symptoms being the most prevalent. Common travel-related infections include malaria, dengue, mononucleosis, *Rickettsia* infection, typhoid, paratyphoid, human immunodeficiency virus, hepatitis A, yellow fever, rabies, and many more. An initial evaluation of these travelers should employ a methodical approach to determine whether travelers pose any public health risks, which often have been listed as notifiable diseases by the World Health Organization.

Case presentation

A 33-year-old male engineer with no known medical history presented with a high fever for three days and reduced consciousness on the day of admission. He arrived in Malaysia two days ago from Sudan, South Africa for a one-week business trip. Upon arrival at our hospital, his Glasgow Coma Scale (GCS) score was E4V4M5 but dropped to E2V1M1 on the second day after his admission, thus

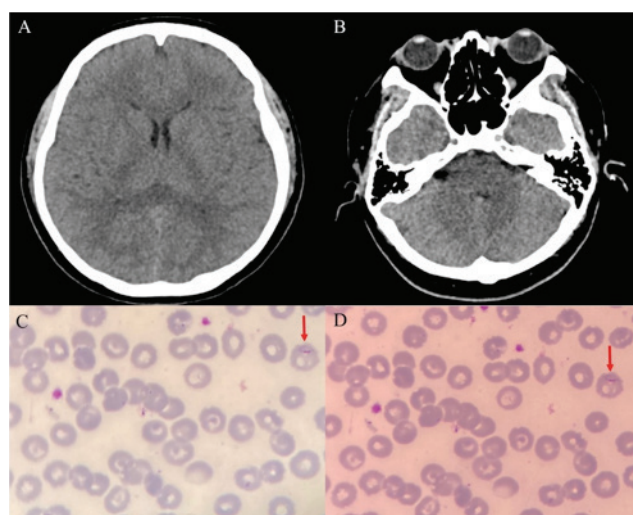
requiring mechanical ventilation. He was hemodynamically stable but was persistently febrile. Systemic reviews and physical examinations revealed nothing remarkable. Brain computed tomography showed preserved grey white matter differentiations with no effacement of cerebral sulci (Figure 1, Panels A & B). A travel checklist was performed, revealing that he had failed to take his malaria chemoprophylaxis and had not complied with the WHO's pre-travel vaccination recommendations. His malaria blood film taken on the day of admission confirmed the presence of plasmodium falciparum (Figure 1, Panels C & D). He was treated for severe cerebral malaria (displaying reduced consciousness) with an intravenous artesunate dosage of 240 mg (2.4 mg/kg) stat at 0 hours, 12 hours, and 24 hours. The patient was subsequently given this dosage once daily for 1 week (switched to oral artemether/lumefantrine (Riamet) after he was able to tolerate oral medication. Next, he completed a minimum of 3 doses of IV artesunate: 100 mg oral doxycycline twice daily for 7 days and 30 mg oral primaquine once daily for 14 days. There was no renal impairment, hypoglycemia, acidosis, hemorrhage, shock, or pulmonary edema upon admission (Table 1). The patient subsequently developed acute kidney injury on Day 5, which resolved with supportive measures by Day 10 (Table 1). His raised transaminitis resolved by Day 14. Lumbar puncture was performed to rule out bacterial meningitis, and his cerebrospinal fluid results were normal. He made an uneventful recovery and was discharged on Day 10 of admission.

Table 1: Laboratory investigations

	Normal range	Day 1	Day 2	Day 5	Day 10
Full blood count					
Hemoglobin	13.0-17.0 g/L	13.8	12.6	10.0	9.3
Hematocrit	39.0-52.0 %	36.7	35.2	28.6	29.5
White blood cell	4.0-11.0, 10^9 g/L	7.3	8.2	4.5	11.8
Platelet	150.0-400.0, 10^9 g/L	167.0	130.0	202.0	561.0
Renal Profile					
Urea	2.8-7.0 mmol/L	4.3	7.3	17.4	9.2
Sodium	136.0-146.0 mmol/L	132.0	136.0	145.0	134.0
Potassium	3.5-5.0 mmol/L	3.0	3.6	4.3	3.8
Creatinine	59.0-104.0 mmol/L	85.0	75.0	145.	64.0
Liver Function Test					
Total Protein	66.0-83.0 g/L	75.0	67.0	60.0	84.0
Albumin	35.0-52.0 g/L	33.0	27.0	23.0	34.0
Globulin	28.0-36.0 g/L	42.0	40.0	38.0	50.0
Total bilirubin	5.0-21.0 μ mol/L	18.7	11.9	5.3	15.4
Alanine transaminase	<50.0 U/L	48.0	28.0	13.0	115.0
Aspartate transaminase	< 50.0 U/L	50.0	24.0	20.0	43.0
Alkaline phosphatase	30.0-120.0 U/L	59.0	39.0	36.0	183.0
Creatinine kinase	22.0-198.0 U/L		222.0	201.0	
Lactate dehydrogenase	140.0-280.0 U/L		326.0	301.0	
Erythrocyte sedimentation rate	mm/hour		35.0		
C-reactive protein	< 3.0 mg/L		114.7		41.2
Serum lactate	0.5-1.0 mmol/L		1.4		
Blood & urine culture		Negative			
CSF Investigation:		CSF pressure: 5 cmH2O (normal), clear appearance; no red blood cells; < 2 white blood cells seen			
Cell count		CSF/Serum glucose ratio: 90% (normal)			
Biochemistry		CSF protein: 0.3 mmol/L (normal)			
Culture & sensitivity		No growth			
Gram stain		Negative			
Acid fast bacilli		No acid-fast bacilli seen			

Table 2: Parasite count on admission and after initiating treatment

Day of admission	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Parasite count (/ μ L)	36000	2739	684	377	176	0	0	0

**Figure 1**

Panel A & B: Brain computed tomography showed preserved grey-white matter differentiations with no effacement of the cerebral sulci and no evidence of white matter edema or hydrocephalus.

Panel C & D: Blood film for malaria parasite (thin film) confirmed the presence of *Plasmodium falciparum* rings (red arrows) in the erythrocytes. A low magnification (10 $\times$ or 20 $\times$ objective lens) was used.

Discussion

A detailed travel history and checklist to identify potential risks should be performed in all returned travelers presenting with fever. An early assessment should occur to determine the need for isolation to lower the risk of transmission. Some common travel-related illnesses include malaria, dengue, mononucleosis, enteric fever, and *Rickettsia* infection. Conditions for which immunizations were available, such as enteric fever, hepatitis A, and influenza, were identified in a minority of cases. A travel checklist (Table 3) would be helpful in curtailing such diagnoses.

Table 3: Travel Checklist ^{6,7,8,9}

Travel Location (Geographical location):
Travel Dates (Departure, return dates):
General medical history: Past medical history: Pre-travel immunization ⁹ : hepatitis A, typhoid, influenza
Reasons for traveling, type of transportation, nature of accommodation:
Area visited & activities involved:
High-risk exposures or activities (e.g., insect bites, unclean water and food source, exposure to animal, sexual contact):
Malaria chemoprophylaxis (drug, doses, duration of therapy) (for tourists visiting malaria-endemic regions):
Contact with or personal history of illness:

Malaria is a global tropical vector-borne disease which is transmitted through a bite from a female *Anopheles* mosquito. This condition is annually responsible for around 3 million deaths worldwide.⁴ Malaria in humans is commonly caused by *Plasmodium falciparum*, *P. vivax*, *P. malariae*, *P. knowlesi*, or *P. ovale*. Malaria is commonly diagnosed in febrile returned travelers, accounting for 5–29% of all such individuals presenting symptoms at specialist clinics and 26–75% of all patients hospitalized with a systemic febrile illness.⁵ Patients can present with fever, malaise, nausea, vomiting, abdominal pain, diarrhea, myalgia, and anemia. *Plasmodium falciparum* is a life-threatening infection that accounts for 25–55% of deaths in febrile returned travelers.⁵ Malaria is diagnosed by identifying plasmodium parasites in blood smears. Severe malaria could lead to death upon presentation, so early assessment and prompt anti-malarial therapy is essential. Supportive care is critical to manage complications associated with the organ failure seen in severe malaria.

Conclusion

Primary health care providers should employ a systematic approach in handling returned travelers presenting with fever. A thorough

history should be taken, and a physical examination and clinical and epidemiological risk assessments should be performed to identify potential life-threatening infections. Namely, malaria and other emerging infectious diseases should be excluded.

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Informed consent

Written informed consent for this paper (including images, case history, and data) were obtained from the patient for the publication of this paper, including accompanying figures.

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A Rare Case of an Infant with Left Hemiparesis: A Case Report of Bilateral Open-lip Schizencephaly

Siti BC, Zulkifli MM, Mohd Yusoff SS, Muhamad R, Ahmad TM

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Abstract

Schizencephaly is a very rare congenital birth defect. It is characterized by a cortical brain malformation that manifests as a grey-matter-lined cleft extending from the ependyma to the pia mater. It is a rare condition, and few cases have been reported in the literature. The exact cause is unknown. Herein, we report a case of an infant presenting with left side hemiparesis. The CT scan of her brain revealed right fronto-temporal and left parieto-temporal open-lip schizencephaly; thus, urgent referral to a pediatric neurologist was made for early intervention.

Introduction

Schizencephaly is a rare congenital brain malformation in which abnormal slits or clefts form in the cerebral hemispheres of the brain. There are two types, introduced by Yakovlev and Wadsworth in 1941:¹ the sides of the cleft may be in contact (closed-or fused-lip), also known as Type I, or widely separated (open-lip), also known as Type II. Yakovlev and Wadsworth proposed that both open and closed types were caused by a primary developmental failure of growth of the cerebral mantle before the end of the second month of fetal life.¹ The prevalence of this condition in the United Kingdom's population is about 1.48 in 100 000 births.² About 47% of schizencephaly cases are diagnosed during an antenatal ultrasound.² The majority of cases are detected after 22 weeks of gestation, and most of the cases occur in younger mothers.²

Symptoms of schizencephaly vary depending on the severity of the lesion and whether the lesion involves one or both hemispheres. A lesion that is small and unilateral presents with unilateral paralysis and mild or no intellectual disabilities; in contrast, larger bilateral hemisphere lesions usually present with quadriplegia and severe intellectual disabilities.³ Other signs and symptoms that can be observed are global developmental delay, seizure, microcephaly, hydrocephalus, spasticity, and hypotonia.³

This case report reviews a rare case for doctors at a primary care clinic attending an infant with left-side hemiparesis. It encourages awareness of schizencephaly as a differential diagnosis, and points out that non-accidental injury needs to be ruled out first.

Case report

A 10-months old Malay baby girl presented to our outpatient clinic with three weeks' history of left-limb weakness noted by her foster mother. Her foster mother noticed that the baby had reached for an object with her right hand and not passed the object to her left hand. She moved only her right leg while lying supine, and she was still unable to crawl. She had no other symptoms. Further history-taking revealed that she had no history of trauma, seizure, or fever. She was born at 36 weeks of gestation via spontaneous vertex delivery with a birth weight of 3.0 kilograms. Her current weight is 7.1 kilograms. Her antenatal, intrapartum and postpartum states were uneventful. She had no previous medical illness and no history of hospitalization. She started weaning at six months and, at time of presentation, tolerated porridge with blended fish. The baby had completed her immunizations up to age standards, and had regular checkups at the nearest health clinic.

There was no family history of syndromic children, epilepsy, or learning disabilities. Her biological father is 37 years old, works as a laborer and is an active substance abuser. Her biological mother is 35 years old and works as a clerk. She is the youngest child of five siblings. All other siblings are healthy. There was no history of any abuse or neglect in the family. She was adopted by her own uncle and aunt at seven months old, as the couple had no children after ten years of marriage.

During examination, the child was active and playful, displaying no features of a syndromic child. Her developmental milestones

corresponded to those of children six to seven months old. She was able to roll from prone to supine, but unable to sit without support. She was mouthing but had no pincer grip yet. She was babbling and smiled responsively, and she had no stranger anxiety. Her head circumference was below the 3rd percentile and her weight and height were in the 5th and 25th centiles respectively. Vital signs were normal. Central nervous system examination showed an upper motor neuron lesion of the left limbs with left upper and lower-limb hypertonia, hyperreflexia and an upgoing Babinski sign. The right limbs were normal. There was no limb clonus or eye nystagmus. Several differential diagnoses were made at the time. Among the possibilities were stroke, congenital brain anomaly, brain tumor, cerebral palsy or non-accidental injury (NAI) with underlying global developmental delay. NAI needed to be rule out first. Her biological parents had been contacted to obtain a history of the baby's development and social background. Neither parents ever hit or abused the baby. They were aware of developmental delay in their child, but assumed she would catch up soon. Physical examination of the skin revealed no bruises, no hand or bite marks, no injuries and no

retinal hemorrhage. Skull, chest, upper-limb and lower-limb radiographs all showed normal findings.

Basic blood investigations such as pack cell volume and electrolytes were all normal. Infective screening for Toxoplasma-IgM was negative. Toxoplasma-IgG was indeterminate. Cytomegalovirus (CMV)-IgM was not detected; however, CMV-IgG was reactive. The CMV-IgG (IU/mL) titer was 26.58 (normal range <0.6). HSV-1 and 2 IgG were non-reactive. An urgent computed tomography (CT) scan of the brain was performed. It showed cerebrospinal fluid cleft formation from the cortex to the lateral wall of the right lateral ventricle in the right fronto-temporal region, and similar cleft formation in the left parieto-temporal region, that was suggestive of right fronto-temporal and left parieto-temporal open schizencephaly.

She was referred to the pediatric neurology team and was admitted to the ward for further investigation and management. The findings of a magnetic resonance imaging (MRI) scan of her brain were as shown below:

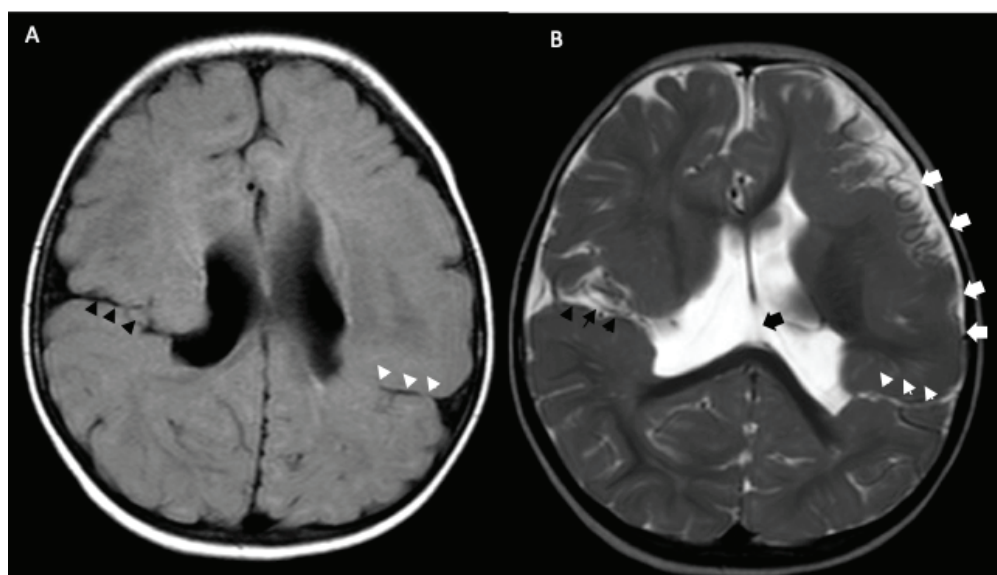


Figure 1(A): Axial view MRI of the brain on FLAIR. **Figure 1(B):** Axial view MRI of the brain on T2. Several CSF cleft seen at the lined by grey white matter which extended to the lateral ventricle at the right fronto-temporal-lobe (black head arrow) and left parieto-temporal lobe (white head arrow). Smooth gyri at the left frontal lobe (white bold arrow). Partially partial agenesis of the septum pellucidum (bold black arrow).

The Magnetic Resonance Imaging (MRI) findings show the presence of several cerebral spinal fluid (CSF) clefts, lined by grey white matter, which extend from the lateral ventricle to the peripheral of CSF space seen at the right fronto-temporal lobe, left parieto-temporal lobe and left frontal lobe in keeping with open-lip schizencephaly. Broad, thickened gyri in keeping with heterotopic grey matter appear along the cleft. Lissencephaly is seen on the left frontal lobe, represented as smooth gyri.

A diagnosis of bilateral open-lip schizencephaly with global developmental delay was made. The child was seen by a pediatric neurologist, and an electroencephalogram (EEG) brain scan and audiometry were arranged for further assessment. The EEG showed frequent bursts of sharp wave discharge over the right mid-parietal and posterior temporal region; polymorphic slow wave discharge over the parieto-temporal region with radiation to the left mid-parietal region; and some in-phase reversing pattern over the temporal region. However, no seizure occurred. Her audiometry was normal. She was referred to a physiotherapist and a speech therapist for early intervention. Her condition was explained to her foster parents, with future anticipated problems such as seizure, speech delay and learning difficulties. They were quite sad after hearing the news; however, they had accepted the baby from the beginning, viewing her as their beloved child adopted from their own sibling, and were committed to continuing accepting and caring for her as she was.

The patient is currently on regular speech therapy and physiotherapy to improve her speech and motor development. She has also been referred to social welfare services, which will allow her to greatly benefit from government aid, such as a monetary fund of \$72.00 USD per month, free special school placement, subsidized public transport, and exemption from income tax. During follow-up, she showed good progress in her motor and speech development milestones, and both her foster parents were happy with her improvement.

Discussion

Schizencephaly is a very rare congenital anomaly. There is little local statistical data regarding schizencephaly. A study was done by Abdullah et al in 2001, reporting on hydrocephalic children presenting to a Malaysian community-based university hospital over an 8-year period.⁴ It showed the congenital anomaly causes of hydrocephalus; aqueductal stenosis was the most common (34%), followed by Dandy Walker variants (28.7%) and others (e.g. schizencephaly, holoprosencephaly) that accounted for 64 cases (36.8%).⁴

Schizencephaly in children is about of neuronal migration characterised by a cerebrospinal fluid-filled cleft, lined by gray matter.⁵ The cleft

extends across the entire cerebral hemisphere, from the ventricular surface (ependyma) to the periphery (pial surface) of the brain.⁵ The clefts may be unilateral or bilateral and may be closed (fused lips), as in schizencephaly type I, or separated (open lips), as in schizencephaly type II.⁵

The actual cause of schizencephaly is unknown, but it has been linked to both genetic and non-genetic causes. A few patients with schizencephaly have been found to have mutations in one of these four genes: EMX2, SIX3, SHH, and COL4A1.³ The non-genetic causes are young maternal age; certain medications such as warfarin and recreational drugs; exposure to organic solvents; infections such as cytomegalovirus; trauma; and amniocentesis. It has also been associated with alloimmune thrombocytopenia and various other syndromes.² Non-genetic causes involve a destructive process mediated by vascular injury that causes impairment of the blood supply to the fetus.²

This patient's father was actively involved in substance abuse, which could appear to be one of the factors in her condition. The infant's CMV IgG positive could also be a possible contributing cause of schizencephaly in this patient.

Presentation and outcome are variable depending on whether the lesion shows unilateral or bilateral involvement. Patients usually present with seizures, hemiparesis, and developmental deficits.³ In this case, the infant presented with left hemiparesis, microcephaly and global developmental delay, but no seizures occurred.

Differential diagnosis of an infant presenting with hemiparesis includes trauma of the brain, developmental anomalies of the brain, neoplastic intracranial space-occupying lesions, and central nervous system infections, such as encephalitis, meningitis or abscesses.⁶ Other disease entities that should also be considered in the differential diagnosis of schizencephaly are acquired cysts of the brain such as those from post-traumatic, postoperative, post-haemorrhage, or postictal events.⁷ In such cases, an MRI scan shows areas of gliosis such as glial scars surrounding the fluid-filled lesions.⁷ Open-lip schizencephaly should also be differentiated from hydrocephalus and from holoprosencephaly where extensive intracranial fluid-filled spaces are seen in the MRI.⁷

The diagnosis of schizencephaly is confirmed via imaging. The full thickness cleft, or pial-ependymal seam, may be difficult to detect on a CT scan but is easily discernible in MRI images.⁸ MRI is the imaging modality of choice because of its ability to identify grey matter lining the cleft, which is the pathognomonic finding that differentiates schizencephaly from porencephaly.⁸ The most important differentiating element in imaging studies is the presence of heterotrophic grey matter: this lines the margins of the cleft in cases of schizencephaly, while it is absent in arachnoid cysts or in fluid-filled spaces with other backgrounds.⁸ Moreover, arachnoid cysts may cause a mass effect manifested as displacement of the longitudinal fissure of the brain, compression of the ventricular system, or local obliteration of brain sulci and fissures, which are not evident in schizencephaly.⁸

In managing schizencephaly, a multidisciplinary approach is applied. The therapeutic management of both types of schizencephaly predominantly consists of rehabilitating motor deficits and mental retardation and treating epilepsy.⁹ Some cases need surgical treatment, such as schizencephaly with concomitant hydrocephalus or intracranial hypertension.⁹

Surgical management is associated with a risk of such complications as postoperative bleeding, empyemas, meningitis, hydrocephalus, and distension of the paracerebral fluid spaces forming subdural hygromas or hygromatomas.⁷ When shunting, which has a complication rate of approximately 50%, is employed as the therapeutic modality, the patient may additionally develop such

complications as shunt system impatency, pulling and detachment of the drain, and ascites.⁷ If drainage is maintained for longer periods, complications may also include endocarditis and shunt nephritis.⁷ Therefore, schizencephaly itself and its associated symptoms are treated conservatively.^{7,9}

The way that primary care providers approach an infant with hemiparesis is crucial, as they will be the first-contact care in establishing a diagnosis. Early referral to the appropriate team is important to ensure the patient receives early intervention. Primary care providers also need to follow up to ensure continuity of care, community rehabilitation and appropriate learning and education programs during the child's school years.

Conclusion

Primary care practitioners play an important role in screening and recognizing any abnormal signs and symptoms or delayed developmental milestones in infants. As the front-liner, it is prudent for them to be aware of schizencephaly as a differential diagnosis; this may permit early evaluation and intervention to significantly improve the infant's quality of life.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

Consent for publication

The patient's parent provided us informed consent for the publication of this case report.

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Ensuring the penile glans is fully visible before incising the foreskin is a recommended step during male circumcision to avoid penile glans injury

Razrim R

Razrim R. Ensuring the penile glans is fully visible before incising the foreskin is a recommended step during male circumcision to avoid penile glans injury. *Malays Fam Physician*. 2020;15(3):95–96.

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Dear Editor-in-Chief,

The majority of ritual circumcisions for males in Malaysia are conducted in primary healthcare facilities. In a study in rural Kedah, 74% of circumcisions were conducted in private general practice clinics.¹ Hospitals in Malaysia generally conduct circumcisions when there is a disease process to the penile foreskin, such as phimosis, paraphimosis, or recurrent posthitis.

The incidence of complications from circumcision is low. In a systematic review examining complications of male circumcisions worldwide, the median frequency of all complications was 1.5%.² The majority of complications were minor, such as minimal bleeding or mild infection, for which conservative measures usually provided adequate management.

A rare but dreadful complication of circumcision is injury to the penile glans. This injury can occur in the form of glanular necrosis, laceration, or amputation. Glanular amputation is difficult to manage and requires complex corrective surgery by urologists or plastic surgeons, and satisfactory results are not guaranteed. The true incidence of glanular injury is difficult to determine and may be underreported. When injury to the glans does occur, the case has the potential to attract unfavorable publicity and media attention,^{3,4} along with potential adverse legal consequences to the medical practitioner.

In general practice, doctors use various methods to perform circumcisions. These techniques can be categorized into conventional surgery, methods employing electro surgery or electrocautery, and methods employing various clamp devices.

Regardless of the method used to perform the circumcision, steps to ensure that the glans is fully visible prior to and during the cutting of the foreskin is recommended to avoid penile glans injury. This step is at times omitted for the faster guillotine method. The guillotine method involves pulling the tip of the foreskin distally from the glans, after which an instrument (e.g. forceps or bone-cutter) is used to protect the glans, before incising the foreskin above and adjacent to the instrument. During this step, the glans is not visible when the incision to the foreskin is made. This is when the glans can inadvertently be injured, as reported in 3 cases of glanular amputation in a case series in South Africa.⁵

According to the World Health Organization (WHO), the dorsal slit method is the most widely used surgical method for circumcision.⁶ The main advantage of this method is that the glans is visible when the incision to the foreskin is made. This method is also the method of choice of the Malaysian Ministry of Health (MOH) to credential medical assistants in performing circumcisions. The MOH has published an excellent pictorial manual of the dorsal slit technique.⁷

Most circumcisions on young people are performed during school holidays. During this time, medical practitioners may feel the need to adopt faster methods to perform circumcisions. This is the reason circumcisions incorporating electro surgery or electrocautery methods are popular. Circumcisions using electro surgery have proven to be faster, and they produce less bleeding.⁸ Certain methods of circumcision using electro surgery or electrocautery involve using the guillotine method to incise the foreskin. This is when penile glans injury can potentially occur.

An approach in which conventional dorsal slit surgery incorporates electrosurgery can also be employed. This is not a novel technique; only the instrument used to perform the main incision to the foreskin is different. This approach ensures visibility of the glans prior to removal of the foreskin, with the benefits of a faster procedure and less bleeding. A dorsal slit is made with scissors to the dorsal aspect of the foreskin, as usual. A bipolar diathermy (e.g., ophthalmic bipolar forceps) is then used to make the circumferential cut to the foreskin instead of scissors. The circumcision is then completed in the conventional manner.

This author is not advocating the ban of the guillotine method in performing circumcisions. This method is widely used among pediatric and general surgeons with no (reported) cases of penile glans injury. For other medical practitioners who do not perform surgery on a regular basis, a dorsal slit to enable the glans to be fully visible prior to incising the rest of the foreskin will likely reduce the incidence of glanular injury. In this regard, it is always wise to adhere to this surgical dictum: "Operate with your eyes, not with your faith."

Conflicts of interest

There are no conflicts of interest.

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Angina following anaphylaxis: Kounis syndrome or adrenaline effect?

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We have read with interest a report published in *Malaysian Family Physician*¹ on a 23-year-old Malay atopic patient with a known allergy (angioedema) to metoclopramide, tramadol, aspirin, and CT contrast media who was stung by an insect and developed throat tightness, vomiting, and a swollen uvula. As he was being treated with intramuscular tetanus toxoid, intravenous hydrocortisone, intravenous chlorpheniramine, and 0.5mg (1:1000) of intramuscular adrenaline for anaphylactic shock, he presented, within minutes, with a sudden escalation of drowsiness, worsening throat tightness and chest pain so excruciating on his left side that he fainted. The patient's electrocardiograms and cardiac enzymes were normal, however, and he regained consciousness with a high oxygen flow of 15 liters per minute. The following day, the patient was discharged in good condition. This report raises the issue of whether the excruciating chest pain was the result of the intramuscular adrenalin administration or of a Kounis Type I syndrome manifestation.

This atopic patient had a previous history of allergic reactions, such as angioedema, in response to several agents. Atopy refers to an inherited predisposition to produce immunoglobulin E antibodies in response to small amounts of common environmental exposures, including pollens, house dust mites, and food allergens, which can act as haptens, attaching to serum proteins.² In a recent study on atopy, it was found that the risk of anaphylaxis was independent of the type of causative drug, whereas atopy had a direct effect on the anaphylactic risk.³ The patient was stung by an insect in his backyard and subsequently received intramuscular tetanus toxoid, intravenous hydrocortisone, and intravenous chlorpheniramine, followed by intravenous adrenaline. Any of these 4 drugs or the insect sting itself could have acted as allergens, causing the anaphylactic shock and/or Kounis syndrome.^{4,5,6,7}

Paradoxically adrenaline, the drug that is life-saving in anaphylaxis, can by itself induce anaphylaxis. Indeed, every commercially available preparation of adrenaline contains sodium metabisulfite as a preservative, according to Drug Facts and Comparisons (a standard pharmacy reference published by Wolters Kluwer and updated monthly). Sodium metabisulfite is commonly used as an antioxidant in the food and pharmaceutical industries. Anaphylactic shock has been reported during the administration of epidural anesthesia for caesarian sections, in which the culprit was metabisulfite, an additive agent of local anesthetics containing adrenaline.⁸ This situation poses a therapeutic dilemma in sulfite-sensitive patients who suffer from anaphylactic shock. Physicians dealing with anaphylactic shock should be aware of this association. Fortunately, free sulfite adrenaline is currently commercially available for administration to sulfite-sensitive patients (American Regent Inc, USA).⁹ In this situation, a possible alternative is glucagon, which has been used successfully for treatment of anaphylaxis in patients taking β -blockers.¹⁰

Exogenous adrenaline administration is a life-saving procedure and, according to international guidelines, it should be injected intramuscularly at a dose of 0.01 mg/kg of a 1:1000 (1 mg/mL) solution,¹¹ to a maximum dose of 0.5mg in adults.¹² For IV administration, appropriately diluted solutions (1:10 000 [0.1mg/mL] or 1:100 000 [0.01mg/mL]), may contribute to coronary spasm.

Adrenaline actions include the following:

1. Peripheral vasoconstriction via $\alpha 1$ receptors¹³
2. Increasing both the rate and force of cardiac contractions via $\beta 1$ receptors¹⁴
3. Reversing bronchoconstriction and reducing the release of inflammatory mediators via $\beta 2$ receptors¹⁵
4. Promoting platelet activation via specific receptors found on the platelet surface¹⁶
5. Inducing platelet aggregation by increasing platelet production of thromboxane B2¹⁷
6. Heightening platelet sensitivity to adenosine diphosphate¹⁸
7. Promoting thrombin-induced binding of platelets to fibrinogen.¹⁹

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Actions 4–7, therefore, aggravate myocardial ischemia, prolong QTc intervals, and induce coronary vasospasm and arrhythmias. Elderly patients, especially those with histories of hypertension and coronary artery disease, are prone to these side effects. Both α - (α_1 - and α_2 -) and β_1 -adrenergic receptors are present in the coronary arteries but with different distributions. The large coronary arteries are equipped mainly with α receptors, which mediate contraction.

In the present case, the patient's heart rate was 94 beats per minute (bpm) before adrenaline administration, which reduced it to 82 bpm. Therefore, adrenaline appears less likely to be the cause of the patient's excruciating chest pain in the absence of the above symptoms, such as tachycardia, which are typically induced by adrenaline. However, without coronary angiography or any evidence of left ventricular dysfunction, it is impossible to explain which came first—the egg or the chicken.

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