

Influence of Gender on Clinical Examination Practices Among Undergraduate Medical Students

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Article accepted: 04-12-2023

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ABSTRACT

Introduction: Clinical examinations are considered crucial clinical skills and are a significant component of a doctor's everyday duties. This study aimed to assess the association between gender and the frequency of clinical examinations, student's perceived clinical examination competency and its associated factors among medical students.

Methods: A cross-sectional study was conducted from July to August 2022 in a private medical university in Malaysia. The respondents were recruited by purposive sampling and the data was collected using Google form. The main outcomes were frequency of clinical examinations conducted, influence of gender in conducting clinical examination, confidence, and perceived clinical competency among clinical year undergraduate medical students.

Results: A total of 130 respondents participated in the study. The findings revealed that a higher proportion of male respondents (68.5%) were sometimes refused by patients of the opposite sex to be present during clinical examination compared to females (28.9%). Besides that, 68.5% of males reported that their gender negatively affected their learning experience compared to female respondents (30.3%). Regarding the intimate examinations, male respondents were 2.74 times more likely to conduct ≥ 1 -time male genitalia examination on patients than female respondents (95%CI: 1.16, 6.51). Practicing clinical examinations with actual patient was reported to be the most preferred methods by the respondents (87.7%). There was a significant association between the study year and respondents' self-perception of their clinical competency skills (OR 2.69, 95%CI: 1.54, 3.83).

Conclusion: Gender has an impact on clinical learning in medical students in a variety of ways, including clinical exposure, patients' willingness, and consent. The extra effort is needed to make sure all students are learning the necessary skills and giving complete and acceptable patient care.

Keywords:

Gender, Clinical examination skill, medical students, Perceived competency, Malaysia.

INTRODUCTION

Clinical examinations are considered crucial clinical skills and are a significant component of a doctor's everyday duties (Grüne, 2016). A physical examination evaluates objective anatomic findings through general observation, palpation, percussion, and auscultation. The information gathered needs to be deliberately incorporated with the pathophysiology and medical history of the patient (1990). It is important to have adequate clinical examination skills as they are recognized to greatly lower the likelihood of medical mistakes and adverse outcomes.(Verghese *et al.*, 2015). Furthermore, it is conceivable that earlier evidence-based clinical assessment can prevent improper or excessive use of diagnostic technology (Elder, Japp and Verghese, 2016). Providing high quality healthcare promotes the desired health outcome and contributes to achieve sustainable development goals (Kruk *et al.*, 2018). Therefore, competency of clinical examination in quality healthcare provision is much needed in the 21st century healthcare (Kruk *et al.*, 2018, Ghazi *et al.*, 2020).

The majority of people concur that learning via examination of real patients is still vital as part of training in medical schools, notwithstanding the rise in learning from simulations (Beal *et al.*, 2017). It might be particularly difficult to educate and learn how to perform intimate examinations such as breast, pelvic and male genital examinations. However, cultural norms regarding what constitutes an intimate examination can vary. For instance, any physical interaction between a male and a woman in Jordan or other Middle Eastern nations can be interpreted as intimate, especially given how common it is for patients to want a same-sex doctor. This may be done for genital, chest, thyroid, or abdominal examinations. Both the student and the patient may perceive this discomfort, with the patient often expecting a rapid, private exam. As a result, it could be particularly challenging for trainees to evaluate patients who are of the other sex (Sabet *et al.*, 2020).

Most of the medical students had not undergone any intimate examinations or asked about sexual history, according to a recent study that examined students' attitudes toward these practices that was carried out in 2015 in Saudi Arabia (Abdulghani *et al.*, 2016). Similar research carried out in Saudi Arabia, that involved interns also reported that they had not undergone any intimate examinations and sexual history (Alnassar *et al.*, 2012). The majority of studies related to obstetrics and gynaecology have indicated that gender has an impact on medical practice (Aghajafari *et al.*, 2018), medical student experience(Babaria, Abedin and Nunez-Smith, 2009), and other learning components (McVeigh and Dunne, 2014). According to a previous study, the final year medical students in a Jordanian University showed that the highest frequency of examinations was abdominal examination where 80% of females and 89% of males performed abdominal examinations more than 10 times (Sabet *et al.*, 2020). Interestingly, out of 89% of male students, only 40% examined patients of the opposite sex. Besides that, only 6% of male students performed breast examinations more than five times compared to female students which were 37%. Surprisingly, 44% of male students have never performed breast examinations on patients and only 1.1% of female students have never performed. This shows the significance of how gender plays a crucial role when performing clinical examinations. Globally, medical schools' gender ratios are changing as more female students are enrolling in the field of medicine (Weizblit, Noble and Baerlocher, 2009). A study done at a local university showed that female students constitute more than 60% of medical students (Myint and Tun, 2010).

In general, every medical student has different methods of learning clinical examination skills (Moßhammer *et al.*, 2017). According to Vivekananda-Schmidt (2005), an instructional compact disc (CD) teaching rheumatology examination skill had a demonstrable good educational effect on the acquisition of examination skills in the area of musculoskeletal clinical skills (Averns *et al.*, 2009). Next, a study done by Torre (2004) reported that most students preferred using pocket cards as supplementary learning material (Torre *et al.*, 2004). Besides that, peer-assisted learning also positively affects the acquisition of examination skills (St-Onge *et al.*, 2013). Furthermore, Bokken (2009) investigated students' viewpoints on the benefits and drawbacks of actual patients versus standardized patients. The examination of actual patients was more authentic and instructive, according to the students whereas standardized patients were better suited for practicing intimate examinations and preparing for patient engagement. Additionally, students reported that their communication skills improved by engaging with standardized patients (Bokken *et al.*, 2009).

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Self-perception of one's clinical examination skills is very important. The reported self-efficacy in carrying out a task is known as self-perception (Bandura, 1997). Medical students who have a positive self-perception of their competence are more inclined to invest more of their time and effort in studying and also attempting more clinical examinations. As a result, this would lead to a higher probability of success and an increase in confidence and performance overall (Katowa-Mukwato and Banda, 2016). Besides, the belief or trust a student has in being successful at something is known as self-confidence. For a student to take chances and participate in learning activities, self-confidence is crucial. People who have high self-confidence are certain of their skills, likely to set goals for themselves and work hard to accomplish those goals without worrying about the results (Kanza, 2016).

Due to limited information about the influence of variable factors associated with perceived clinical examination skills among medical students in Malaysia, there is a need to determine the influence of gender and variable factors on medical students' clinical examination performance. This study aimed to assess the association between gender and the frequency of clinical examinations, student's perceived clinical examination competency and its associated factors among medical students. Furthermore, this study aimed to assess the difference between students' confidence level and their self-perception of clinical examination skills across different years of studies. It would be insightful to carry out this research to study the various outcomes these variables cause in the process of evolving from a student into a competent clinician.

METHODS

Study setting

This cross-sectional analytical study was conducted among undergraduate medical students in a private medical university college in Malaysia. In Bachelor of Medicine and Bachelor of Surgery (MBBS) programme, there is a total of 10 semesters, where semesters 1 to 5 are pre-clinical years and semesters 6 to 10 are clinical years. Students from clinical years of the MBBS program (Semester 6-10) were recruited for this study. Students from semesters 6 to 9 are trained in the clinical sectors either in primary healthcare or hospital wards for every morning session, while students from semester 10 are trained in the respective clinical sectors for the whole day.

Study sample

The sample size (n) was calculated by using "Epi Info" version 7.2.4.0. The expected frequency of the respondents who perceived themselves as moderately competent in performing clinical examinations was 66.7%. (Katowa-Mukwato and Banda, 2016) The minimum sample size required with a confidence level of 95%, non-response percentage of 10% was 144.

The respondents were recruited using purposive sampling which was a non-probability sampling method. The inclusion criteria were medical students (MBBS) from clinical year (Semester 6-10) in the study institution who chose to participate in the study voluntarily and to complete all the required parts of the questionnaire given after filling up the consent form. The exclusion criteria were students who did not provide the consent.

2.3 Data collection

A questionnaire in the type of an online form (Google form), open survey, was created and was distributed via student emails or WhatsApp. The questionnaire was prepared based on the previous study, the influence of gender on clinical examination skills of medical students in Jordan: a cross-sectional study (Sabet *et al.*, 2020) and Methods for Teaching Physical Examination Skills to Medical Students (Dull and Haines, 2003). The questionnaire consisted of seven main components as follows; Section 1: Demographic characteristics of the respondents, Section 2: Gender influence on clinical examination including 5 items, Section 3: Frequency of general physical examinations performed on all patients, Section 4: Frequency of general physical examinations performed on patients of other sex, Section 5: Frequency of intimate examinations including male genitalia, breast examinations, and

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contraception, Section 6: Different methods of practicing clinical examination, and Section 7: Self-perception and confidence in performing clinical examination. The student's confidence level was evaluated using a five-point Likert scale consisting of (1= Not confident at all, 2= Less confident, 3= Confident, 4= More confident, 5= Extremely confident) which was adopted from Paul Sander and Lalage Sanders' "Academic Confidence Scale ACS" "Measuring Confidence in Academic Study" (Sanders, 2009). The students' self-perception towards clinical examination with three options (excellent, moderate, and poor). The questionnaire was content validated with six experts from the clinical and public health specialists. The Item Content Validity Index (I-CVI) of each item was 0.83 to 1. The purpose and objective of the study were explained in the Google form and informed consent had taken from the respondents.

Data Protection, Processing, and Analysis

Data files were saved in the institutional computer which was encrypted with password to prevent the unauthorized access. Demographic characteristics of the respondents were analyzed by descriptive statistics and reported frequency and percentage (%). Respondents' experiences of gender influence on clinical examination during their clinical postings and prefer method of clinical examination practises were compared among different gender by using Chi-square or Fisher's exact test. After that, multivariate logistic regression was applied to assess the association between gender and frequency of clinical examination performed during clinical postings. Logistic regression model was adjusted for age, nationality, ethnicity, and semester. The level of significance (α) was set at 5% or 0.05 for the association between independent and dependent variables. Data was analyzed by using SPSS (Version 27).

Ethical Consideration

Questionnaires with important and relevant details of the study were provided to the respondents. Participation in the study was entirely voluntary and respondents had the freedom to withdraw from the study at any time. Informed consent from the respondents was obtained prior to the study. Data collection was anonymous as respondents' information was identified with the data collected. The protection of the privacy of research respondents was ensured. No incentives were given to encourage participation, nor the respondents were forced into taking part in this study. Ethical approval to conduct the study was granted by the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia (MUCM), Malaysia (MUCM/FOM/Research Ethics Committee – 053/2022).

RESULTS

Table 1 shows the demographic characteristics of the respondents. A total of 130 undergraduate clinical years medical respondents participated in this study. The completion rate, the number of people submitting the last questionnaire page, divided by the number of people who agreed to participate, was 100%. Among the respondents 58.5% were female, 77.7% were 23 years and below, 40.8% were Indian and 31.5% were Chinese ethnicity (Table 1).

Table 1. Sociodemographic characteristics of respondents (n= 130)

Variables	n (%)
Gender	
Male	54 (41.5)
Female	76 (58.5)
Age	
≤ 23 years	101 (77.7)
>23 years	29 (22.3)
Nationality	
Malaysian	108 (83.1)
International	22 (16.9)
Ethnicity	
Malay	9 (6.9)
Chinese	41 (31.5)
Indian	53 (40.8)
Others*	27 (20.8)
Study year	
Sem 6 ,7	89 (68.5)
Sem 8, 9, 10	41 (31.5)

*Others (Sri Lankan, Ceylonese, Punjabi, Sikh)

Table 2 presents respondent's experiences of gender influence in conducting clinical examination during their posting. A significant difference was reported by gender where they were refused by different gender patients to conduct clinical examination (sometimes - male: 68.5%, female 28.9%). Male students were more likely to consider that gender affect negatively to their learning experiences (male: 68.5%, female: 30.3%). Female students were more likely to consider that lack of privacy of patients' rooms in Malaysia had an impact on their clinical examination (male: 14.8%, female 27.6%). While male students considered that cultural and religious traditions had an impact on their clinical examination (male: 44.4%, female: 23.7%). More than two-third of the respondents reported that they were refused to conduct intimate examination and most of them were refused by the patient of different gender (Table 2).

Table 2. Respondents' experiences of gender influence on clinical examination (n= 130)

Item	All	Male	Female	P-value
	n (%)	(n=54)	(n=76)	
		n (%)	n (%)	
Has a patient of the other sex refused to have you present during a clinical examination?				
Always	1 (0.8)	1 (1.9)	0 (0.0)	<0.001*
Sometimes	59 (45.4)	37 (68.5)	22 (28.9)	
Rarely	33 (25.4)	11 (20.3)	22 (28.9)	
Never	37 (28.5)	5 (9.3)	32 (42.1)	

How does your gender affect your learning experience?				
Does not at all	60 (46.2)	15 (27.8)	45 (59.2)	<0.001 [†]
Negatively	60(46.2)	37 (68.5)	23 (30.3)	
Positively	10 (7.7)	2 (3.7)	8 (10.5)	
Which of the following have impacted your clinical examination of the other sex?				
Examining a patient from another sex may lead to a misunderstanding	23 (17.7)	8 (14.8)	15 (19.7)	0.127 [†]
Examining a patient from another sex may make you shy/embarrassed	34 (26.2)	13 (24.1)	21 (27.6)	
Lack of privacy of patients' rooms in Malaysia	29 (22.3)	8 (14.8)	21 (27.6)	
Cultural and religious traditions	42 (32.3)	24 (44.4)	18 (23.7)	
Others	2 (1.5)	1 (1.9)	1 (1.3)	
Has a patient ever refused to give you a consent for doing an intimate clinical examination? (e.g., breast, male genitalia, contraception counselling etc.)				
Yes	92 (70.8)	43 (79.6)	49 (64.5)	0.061 [†]
No	38 (29.2)	11 (20.4)	27 (35.5)	
If you answered the last question with 'yes', was the patient is of opposite gender?				
Yes	91 (98.9)	42 (97.7)	49 (100.0)	0.467
No	1 (1.1)	1 (2.3)	0 (0)	

*Fisher's exact test

[†]Chi-square test

Table 3 reports the multivariate logistic regression analysis findings of gender differences in the frequency of clinical examination conducted in the clinical postings. Male respondents were 2.74 times more likely to conduct male genitalia examination compared to female respondents (aOR 2.74, 95% CI: 1.16, 6.51). While male respondents were 80% less likely to conduct breast examination compared to their female counterparts (aOR 0.20, 95%CI: 0.07, 0.54) (Table 3).

Table 3. Multivariate logistic regression analysis on gender and frequency of clinical examination among respondents [aOR] (n=130)

Clinical Examination	Male	Female	aOR*	95%CI	P-value
Frequency of general physical examinations performed on patients of other sex throughout clinical training.					
Cardiovascular					
Up to 5 times	29 (53.7)	47 (61.8)	Reference	0.44, 2.46	0.931
6 and above	25 (46.3)	29 (38.2)	1.04		
Respiratory					
Up to 5 times	31 (57.4)	44 (57.9)	Reference	0.26, 1.55	0.320
6 and above	23 (42.6)	32 (42.1)	0.64		
Abdominal					
Up to 5 times	28 (51.9)	51 (67.1)	Reference	0.60, 3.50	0.414
6 and above	26 (48.1)	25 (32.9)	1.45		
Neurological					
Up to 5 times	38 (70.4)	60 (78.9)	Reference	0.37, 2.99	0.928
6 and above	16 (29.6)	16 (21.1)	1.05		
Frequency of intimate examinations performed on patients throughout clinical training.					
Male genitalia examination					
Never	18 (33.3)	44 (57.9)	Reference	1.16, 6.51	0.022
1 and above	36 (66.7)	32 (42.1)	2.74		
Breast examination					
Never	21 (38.9)	16 (21.1)	Reference	0.07, 0.54	0.001
1 and above	33 (61.1)	60 (78.9)	0.20		
Contraception					
Never	35 (64.8)	57 (75.0)	Reference	0.50, 3.14	0.626
1 and above	19 (35.2)	19 (25.0)	1.26		

*Female - reference category, Model is adjusted for age, nationality, ethnicity, and semester.

Table 4 presents the respondent's preferred methods of practicing clinical examination. Most of the respondents preferred to practice on actual patients (male: 81.5%, female 92.1%), which is followed by the practice with simulated patients (male: 61.1%, female: 61.8%) (Table 4).

Table 4. Respondents' preferred methods of practicing clinical examination (n= 130)

Methods	All n (%) *	Male n (%)	Female n (%)	P-value [†]
Practice on actual patients				
Yes	114 (87.7)	44 (81.5)	70 (92.1)	
No	16 (12.3)	10 (18.5)	6 (7.9)	0.069
Practice on standardized/simulated patients				
Yes	80 (61.5)	33 (61.1)	47 (61.8)	

No	50 (38.5)	21 (38.9)	29 (38.2)	0.933
Practice on peers				
Yes	26 (20.0)	11 (20.4)	15 (19.7)	
No	104 (80.0)	43 (79.6)	61 (80.3)	0.929
Practice on plastic/rubber model (mannequins)				
Yes	16 (12.3)	8 (14.8)	8 (10.5)	
No	114 (89.7)	46 (85.2)	68 (89.5)	0.463
Use of audio-visual aids (e.g.: videos, mp3 audio)				
Yes	21 (16.2)	11 (20.4)	10 (13.2)	
No	109 (83.8)	43 (79.6)	66 (86.8)	0.271

*Two options allowed

†Chi-square test

Figure 1 presents the confidence of the respondents to conduct clinical examinations. Female were more confident to conduct general examination, while male was more confident to conduct intimate examinations (Figure 1).

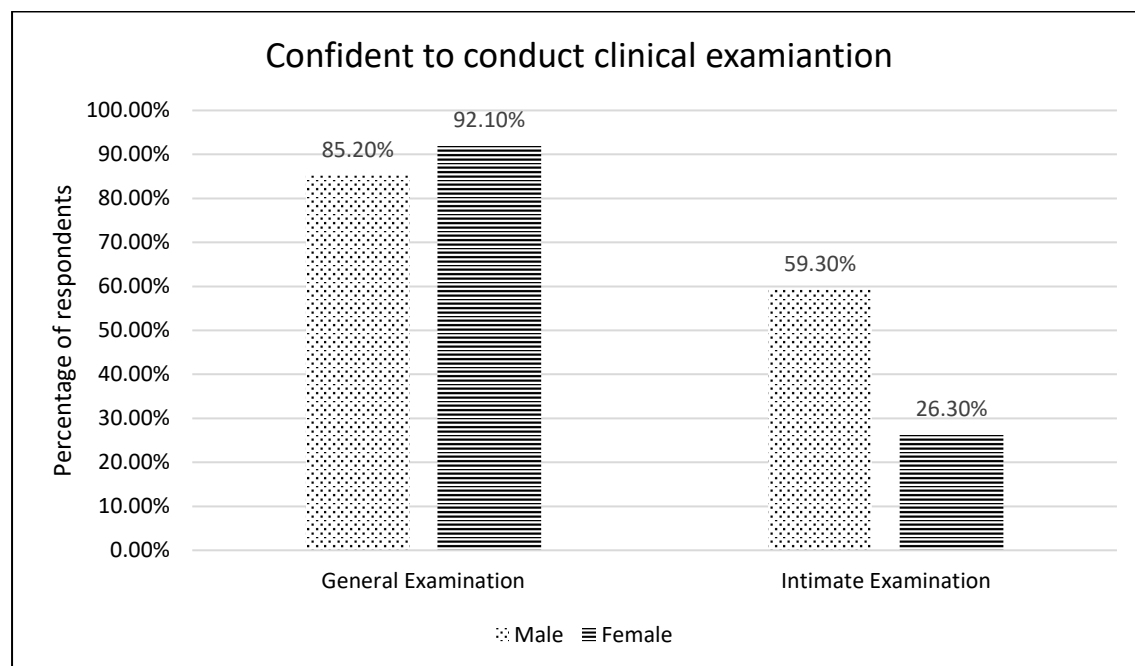


Figure 1. Confident to conduct general and intimate examination among different gender (n=130)

Table 5 presents the factors associated with respondents perceived clinical competency by using ordinal logistic regression. The ordered logit for senior clinical year students (semester 8 -10) being excellent perceived competency is 2.69 more than junior clinical year students (semester 6, 7) when other variables in the model are held constant (Table 5).

Table 5. Ordinal logistic regression analysis of factors associated with perceived clinical competency among respondents (n=130)

Variable	Estimate	P-value	95% CI
Gender			
Male	0.19	0.669	-0.72, 1.11
Female	Reference		
Age			
≤ 23 years	-0.66	0.222	-1.73, 0.40
>23 years	Reference		
Nationality			
Malaysian	-1.11	0.313	-3.27, 1.05
International	Reference		
Ethnicity			
Malay	1.74	0.172	-0.76, 4.24
Chinese	1.26	0.225	-0.78, 3.03
Indian	1.82	0.072	-0.16, 3.80
Others*	Reference		
Study year			
Sem 8, 9, 10	2.69	<0.001	1.54, 3.83
Sem 6, 7	Reference		

*Others (Sri Lankan, Ceylonese, Punjabi, Sikh)

DISCUSSION

This study aimed to assess the association between gender and frequency of clinical examinations, to assess the students' perceived clinical examination competency and its associated factors among medical students. The respondents revealed that they could performed cardiovascular and respiratory clinical examinations on all patients. However, only a minority of students have performed intimate clinical examinations more than five times. One reason for this may be due to the restricted number of students per ward due to COVID-19 hospital regulations. An international survey about the impact of the COVID-19 pandemic on medical students' education and training pointed out that the clinical placements of the respondents have been shortened (TMS Collaborative, 2021). Therefore, the COVID-19 pandemic has not only affected training programs in Malaysian medical schools but also internationally. This had been similar in both low or middle-income countries as well as higher-income countries (Mukharyamova *et al.*, 2021). In our study university, the replacement postings were allocated once the students were allowed to go to the clinical settings to combat the limited training during the COVID-19 pandemic.

Medical students are future physicians and typically trained to approach patients with professionalism, commitment, and respect for patients autonomy (Jahan *et al.*, 2016). Patients' preference on gender of healthcare providers have been reported in previous studies (Kerssens, Bensing and Andela, 1997; Zaghoul, Youssef and El-Einein, 2005), which could be related to our findings of gender influence to conduct clinical examination in the postings. Male respondents were more likely to be refused and negatively affected to due gender, which might be related to the gender of patients they approach and cultural factors in the community (Attum *et al.*, 2023; Arasoo *et al.*, 2021). Similar findings were reported in a study conducted in the tertiary hospital and healthcare centre in Johor, Malaysia, where only 27.4% of women were willingly to consent to male medical students for general examination and 18.9% to consent for pelvic examination (Arasoo *et al.*, 2021). While a study conducted in Jordan

reported that male students felt gender positively impacted their learning experience which contradicts the finding of this study. It is possible that different background may shape their experiences; however, our finding highlights the importance of gender influence in medical education training in Malaysia.

In addition to the specific area of conducting intimate examinations, female respondents reported having conducted more breast examinations whereas male respondents reported having conducted more male genitalia examinations. In contrast, a study done at a Jordanian University reported that males were subjected to more gender discrimination as more females were selected by tutors to conduct intimate clinical examinations. This unintentionally made male student felt less encouraged to conduct intimate clinical examinations (Sabet *et al.*, 2020). Not only to medical students, but also male clinicians were considered as embarrassed and barriers to allow for the breast cancer screening among Malaysian women (Mohan *et al.*, 2021). In our study university, the students were provided with well-equipped clinical skills laboratory and mannequins to overcome these challenges. Simulated patients were also included in the clinical teaching to improve their practice on effective approaches to the physical exam. Further studies may want to investigate the perspective of patients on their gender preferences for clinical examination and ways to improve the acceptance of clinical examination to both genders.

Regarding perceived clinical competency, gender, nationality, age, and different practice methods were not significantly associated with perceived competency among respondents. The reasons for this were unclear. In an article done in Kermanshah, Iran it was reported that both male and female nurses had extremely good mean clinical competence levels, and there was no statistically significant association between the mean clinical competence and gender (Faraji *et al.*, 2019). Another study found that nursing competency depends on the ability to apply knowledge and skills in clinical settings regardless of different practice methods used (Fukada, 2018). Meanwhile, senior year students in our study had higher perceived clinical competency compared to junior year students. This finding could be related to a study in USA about self-confidence and perceived utility of physical examination which revealed that there was a difference in self-confidence between students as there were variations in perceived value across training levels for both general and specific physical examination skills (Wu *et al.*, 2007). The need for time and perseverance while teaching clinical skills had long been acknowledged (Wiener and Nathanson, 1976). Hence this shows that self-confidence depends on the various training levels and long-term experience to be able to carry out clinical examination skills on patients.

This study has some limitations. Firstly, clinical competency was assessed as self-reported data which might lead to information bias as numerous studies demonstrate that subjective self-evaluation did not necessarily correspond to performance as tested objectively (Barnsley *et al.*, 2004). Further studies should be conducted by using specific assessment methods such as Objective Structured Clinical Examination (OSCE) to assess the performance. Secondly, frequency of clinical practice was self-reported data and could lead to the recall bias. This limitation could be reduced by referring to the respondents' clinical logbooks in the future studies. Lastly, the samples were recruited with purposive sampling method in a single institution, which may limit the generalizability of the findings among medical student population in Malaysia. However, this study provided the insight for the area to address gender influence on students' clinical training. This is of particularly importance to train for the intimate examination and alternate measures could be considered to overcome gender-based differences in chance of conducting clinical examination in the academic environment.

CONCLUSION

This study indicated that both general and intimate clinical examination varied between female and male students. Gender has an impact on clinical learning in medical students in a variety of ways, including clinical exposure, patient willingness, and consent. Other alternative methods that should be taken into consideration for practicing intimate clinical examinations are practicing on mannequins and watching clinical examination videos which could overcome the gender barrier, especially on intimate clinical examinations. In addition, practicing on trained standardized patients may lead to improvement in clinical performance, reduced anxiety in students, improve communication skills necessary in

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performing intimate examinations, and enhanced students' awareness of patient anxiety around the examination. It is essential that all students are learning the necessary skills and giving complete and acceptable patient care. Practicing these methods would improve the students' clinical skills competency and confidence levels.

ACKNOWLEDGEMENTS

Overwhelmed in all humbleness and gratefulness, we acknowledge our deepest gratitude to Pro Vice Chancellor Prof. Dr. Adinegara Lutfi Abas, Dean Prof. Dr. Jayakumar Gurusamy for the support to conduct this study. In addition, we would like to cordially express our heartfelt gratitude towards all the respondents who willingly took part in this study. We would like to thank the Higher Management (MUCM) and Research Ethics Committee, Manipal University College Malaysia (MUCM), Malaysia for approving our research.

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