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ORIGINAL ARTICLE

The Survey of Clinical Fundal Height Assessment among The Obstetric Practitioners

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ABSTRACT

Introduction: Clinical fundal height assessment (symphysis-fundal height (SFH), landmark method and finger method) is a common practice among obstetric practitioners despite a lack of evidence on its use. This study aims to determine the attitude and practice of the three methods of clinical estimation of fundal height among obstetric practitioners. **Methods:** This was a cross-sectional study involving 258 doctors who were practising obstetrics in Malaysia, who were recruited through convenience sampling. A validated self-administered questionnaire consisting of background details, and questions on attitude and practice on clinical estimation of fundal height was used. **Results:** From the total of 258 respondents, 237 (91.8%) agreed that estimating fundal height clinically is important and 230 (89.1%) respondents agreed this should be taught to medical students. In addition, 189 (73.3%) and 155 (60.1%) participants felt that SFH should be supplemented with the landmark method and finger method respectively. There were 230 (89.1 %) respondents practising clinical fundal height assessment, with 167/230 (72.6%) practising SFH measurement, 123/230 (53.5%) practising landmark method, and 116/230 (50.4%) practising finger method. This study also found that 96/230 (41.7%) practitioners use a single method for their practice and 134/230 (48.3%) practitioners use a combination of methods. The clinical fundal height assessment also was demonstrated to be associated with gender (p=0.01), highest degree obtained (p=0.00), current place of practice (p=0.00), and current post (p=0.00). **Conclusion:** The majority of obstetrics practitioners agree that clinical fundal height assessment is important and perform it in their daily practice, however, the methods used vary.

KEYWORDS: Symphysis-fundal height, landmark, finger method

INTRODUCTION

Clinical fundal height assessment is routinely being practised among obstetric practitioners worldwide [1-5]. Despite being incorporated in daily practice, surprisingly it lacks strong evidence on standardisation of its technique and lack of data on sensitivity and specificity except for symphysis-fundal height measurement (SFH).

Generally, clinical fundal height assessment is used as a screening tool for abnormal fetal growth in the late second and third trimesters, primarily for fetal growth restriction and macrosomia. It can also be used to screen for polyhydramnios. These conditions if undiagnosed, particularly fetal growth restriction may lead to increased risk of perinatal mortality and morbidity.

However, the assessment of fundal height clinically has been known to be associated with a wide range of intraobserver and interobserver variability, hence making it a less reliable assessment.

Despite the concern about the reliability and accuracy of clinical fundal height assessment, we are fully aware that fetal growth assessment is an essential part of antenatal care [1, 2]. Access to ultrasound is not always available, particularly in rural areas, and performing an ultrasound during every visit to assess fetal growth is not cost-effective either. Therefore, the role of estimating the fundal height clinically becomes essential and relevant [5].

Based on the literature and common clinical practice, there are three methods of performing the clinical fundal height assessment [1-6]. The recommended method is the measurement of symphysis-fundal height [7, 8]. However other methods that are being practised are an estimation based on landmarks, called the landmark method, and another technique called as the finger method.

SFH measurement is well described in the literature [7-8]. This technique is standardised but its limitation is that the finding is very much dependent on the mother's body build, hence a series of measurements is required to make a sensible interpretation.

The second method is the landmark method, which takes a specific landmark as the reference. However, if the umbilicus is not centrally located, the estimation may not be reliable.

The third method is described as the finger method. Primarily it uses the same landmarks as the landmark method, but instead of using distance, it uses how many fingers between the fundus to the prescribed landmark.

For both the landmark method and the finger method, there are a lack of evidence on the description of the techniques, their sensitivity and specificity. The methods have been passed over generations through apprenticeship. Nevertheless, these have always been utilised in daily obstetric practice and have been taught in medical schools. Not to mention, it often confuses the medical students who learn all three techniques and yet, are unsure which one should they follow.

Therefore, this study was conducted with the aim to determine the attitude of obstetric practitioners toward clinical estimation of fundal height, to determine the distribution of methods of clinical estimation of fundal height being practised, and to determine the relationship between practices and the demographics of the obstetrics practitioners.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study involving doctors who were practising in the obstetrics field all over Malaysia from 15th July 2018 until 31st July 2018.

Sample Size Calculation

Sample size estimation for this study was calculated based on the published data by Griffith et al. who reported that the prevalence of medical practitioners measuring symphysis-fundal height was 78% [6]. Hence 78% is the expected frequency of our population. Referring to the total number of medical practitioners registered under the Obstetrics and Gynaecology Society of Malaysia (OGSM), which is 1250 and a confidence limit of 5% along with a confidence interval of 95%, using the sample size calculator, the sample size obtained was 218. Considering 20% possible non-responders, the final sample size was 258.

Selection of the Participants

A questionnaire, in Google Form, was distributed using the WhatsApp application or by hardcopy to OGSM members. However, due to poor response rate, the questionnaire was distributed to the departments of Obstetrics and Gynaecology nationwide, and the recruitment was carried out through convenience sampling. Those who received the questionnaire and agreed to be a part of this study completed the questionnaire voluntarily.

Method of Data Collection

A self-administered questionnaire was used in this study. It consists of three sections; background details, attitude, and practice of clinical estimation of fundal height. The questionnaire is as attached in the Supplementary Data. This questionnaire was validated using a sample consisting of 20 respondents during a pilot study. A reliability test was performed for both sections of attitude and practice. The Cronbach's alpha was 0.89.

This questionnaire was distributed through Google Forms and hard copies. A description of this study was given including the description of each method of clinical estimation of fundal height. The description for each method is as below.

SFH measurement is measured using a measurement tape with the centimetres reading facing below to reduce measurement bias. The uterine fundus is identified first. Subsequently, the upper border of the symphysis pubis at the midline will be identified, and

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the tape will be used to measure the distance between these two points. The SFH is measured in centimetres.

However, for the landmark method, the uterine fundus is identified and marked with one finger. Umbilicus corresponds to 22 weeks of gestation. Slightly above the umbilicus (about one finger above the umbilicus) corresponds to 24 weeks of gestation. The xiphisternum corresponds to 36 weeks of gestation if there is no evidence of fullness of the flank, but it corresponds to 40 weeks if there is evidence of fullness of the flank. The distance between the xiphisternum and 24 weeks of gestation will be divided into three equal compartments. The corresponding weeks of gestation for the uterine fundus is by referring to the landmarks. (Figure 1)

On the other hand, for the finger method, the uterine fundus is identified and marked with one finger. Umbilicus corresponds to 22 weeks of gestation. The xiphisternum corresponds to 36 weeks of gestation if there is no evidence of fullness of the flank, but it corresponds to 40 weeks if there is evidence of fullness of the flank. One finger below the xiphisternum corresponds to either 38 weeks of gestation (if there is evidence of fullness of flank) or 34 weeks of gestation (if there is no evidence of fullness of flank). If the fundus is lower than this point, the distance will be measured using how many fingers are in between the umbilicus to the fundus, with every one finger equal to 2 weeks of gestation. (Figure 2)

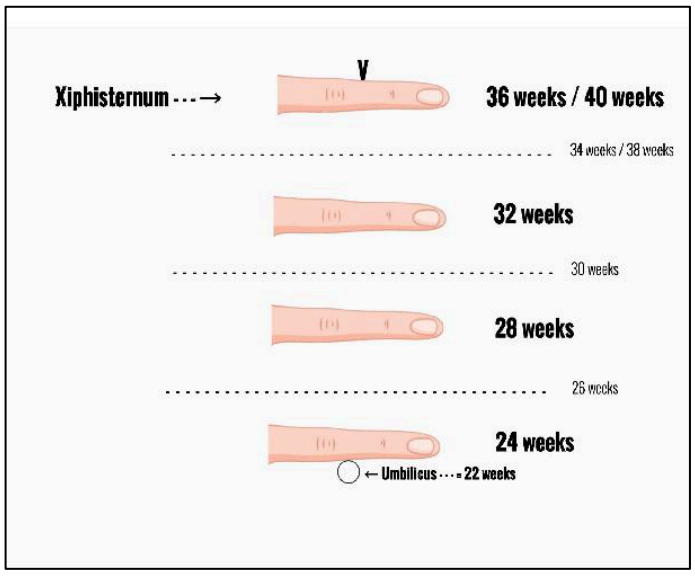

Figure 1 Landmark method

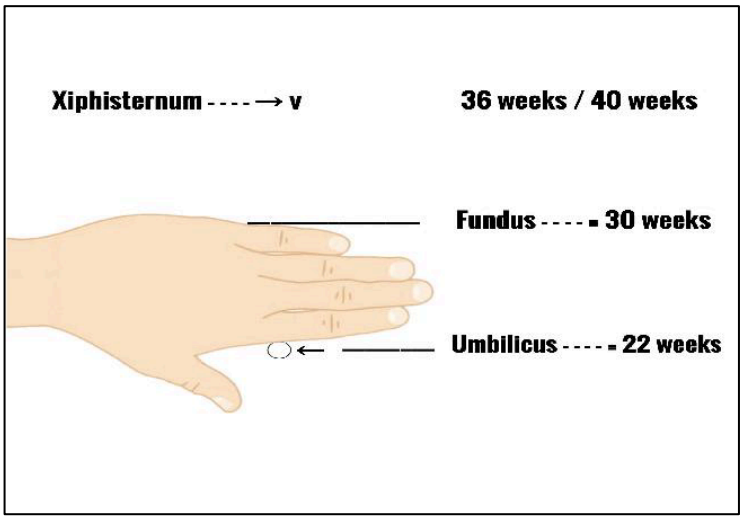

Figure 2 Finger method

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Statistical Analysis

The data was entered and analysed using the Statistical Package for Social Science (SPSS) version 24 (SPSS Inc., Chicago, IL). The categorical data were presented in the form of an absolute number and their corresponding percentage values. Pearson chi-square was used to test for any statistically significant relationship between the practices and the demographic factors. Student t-test was used to look for any significance between the mean age of those who perform and those who do not perform each method. Significant level was taken at a p-value less than 0.05.

Ethical Consideration

Ethical approval was obtained from Universiti Teknologi MARA (UiTM) Ethics Committee (Reference number 600-IRMI (5/1/6))

RESULTS

A total of 258 respondents participated in this study. Table 1 shows the demographic data of the respondents. Figure 3 shows the questions and responses on attitude toward estimating fundal height clinically. The majority (91.8%) of respondents agreed that estimating fundal height clinically is important. In addition, 189 (73.3%) and 155 (60.1%) participants felt that SFH should be supplemented with the landmark method and finger method respectively.

Table 1 Demographic data of respondents

	n (%)	Mean (sd)
Age		39.86 (10.969)
Gender		
Male	83(32.2)	
Female	175(67.8)	
Highest degree		
MD/MBBS	110(42.6)	
MOG/MRCOG	106(41.1)	
Subspecialty-trained	42(16.3)	
First degree obtained		
Local (Malaysia)	163(63.2)	
Overseas	95(36.8)	
Current place of practice		
Clinic (KK/GP)	13(5.0)	
District hospital	34(13.2)	
State hospital	113(43.8)	
University hospital	37(14.3)	
Private hospital	61(23.6)	
Duration of working in obstetrics field		
Less than 1 y	39(15.1)	
1-5y	40(15.5)	
5-10y	42(16.3)	
More than 10y	137(53.1)	
Current post		
House officer	32(12.4)	
Medical officer(trainee)	64(24.8)	
Medical officer (non-trainee)	18(7.0)	
Specialist	41(15.9)	
Consultant	103(39.9)	

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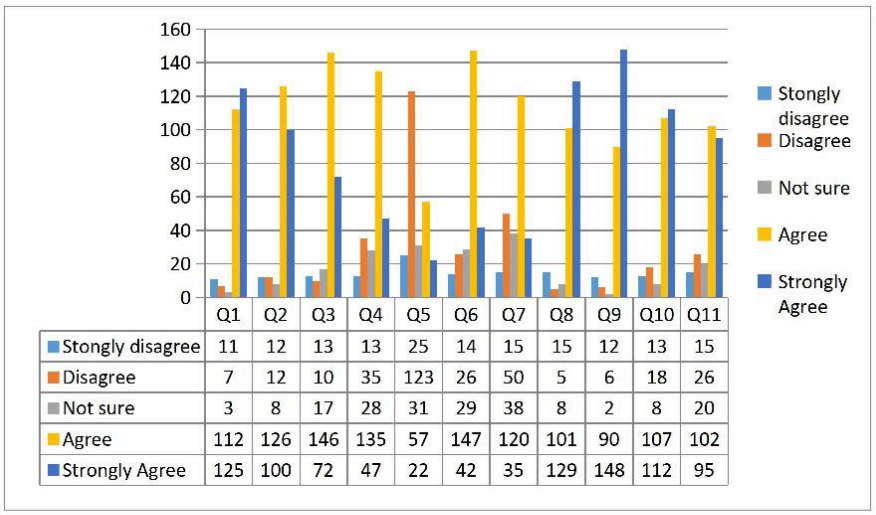

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Stongly disagree	11	12	13	13	25	14	15	15	12	13	15
Disagree	7	12	10	35	123	26	50	5	6	18	26
Not sure	3	8	17	28	31	29	38	8	2	8	20
Agree	112	126	146	135	57	147	120	101	90	107	102
Strongly Agree	125	100	72	47	22	42	35	129	148	112	95

Q1. Estimating fundal height clinically is important.

Q2. Symphysis-fundal height measurement is useful.

Q3. Estimating fundal height using the landmark method is useful.

Q4. Estimating fundal height using finger method is useful.

Q5.Symphysis-fundal height measurement alone is adequate for estimating fundal height clinically.

Q6. Symphysis-fundal height measurement is preferably supplemented with estimation of fundal height by landmark method.

Q7. Symphysis-fundal height measurement is preferably supplemented with estimation of fundal height by finger method.

Q8. Measuring fundal height clinically should be taught to the medical students.

Q9. Medical students should learn how to measure symphysis-fundal height.

Q10.Medical students should learn how to estimate fundal height using the landmark method.

Q11. Medical students should learn how to estimate fundal height using the finger method.

Figure 3 Attitudes on clinical estimation of fundal height

There were 230 (89.1%) participants who measured fundal height clinically in their daily practice. Table 2 shows the distribution of methods (or combination of methods) of clinical fundal height assessment being practised. Out of the 230 participants who practice fundal height assessment, there were 167 (72.6%) practising SFH measurement, 123 (53.5%) practising the landmark method, and 116 (50.4%) practising the finger method. This study also found that 96 (41.7%) practitioners use a single method for their practice and 134 (48.3%) practitioners use a combination of methods.

Table 3 demonstrates the relationship between practices of clinical fundal height assessment and the three methods (SFH, landmark method, and finger method) used and the demographics of respondents. The practice of clinical fundal height assessment was statistically significantly higher among female doctors, those with a first degree (MD/MBBS), those in public practice, those who have been working for ten years or less and being junior (house officers and medical officers). Similar findings were observed with the practice of the finger method. Whereas for the practice of SFH, it was significantly higher among those with a first degree (MD/MBBS), in public practice, who are working for ten years or less, and being junior (house officers and medical officers). The practice of the landmark method was not associated with any demographic factors.

Further analysis showed that there was a statistically significant lower mean age for those performing clinical fundal height assessment (p=0.00), symphysis-fundal height (p=0.03), and finger method (p=0.00). There was no significant difference between the mean age of those performing and not performingthe landmark method (p=0.145). (Table 4)

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Table 2 Prevalence of methods (or combination of methods) of clinical fundal height assessment practiced

Methods	n	%
Symphysis-fundal height only	47	20.4
Landmark method only	31	13.5
Finger method only	18	7.8
Combination of SFH and landmark method	35	15.2
Combination of SFH and finger method	43	18.7
Combination of landmark and finger method	14	6.1
Combination of SFH, landmark and finger method	42	18.3

Table 3 Relationship between practices of clinical fundal height assessment and demographics of participants

	Clinical fundal height assessment			Symphysis-fundal height (SFH)			Landmark method			Finger method		
	Performing (n,%)	Not performing (n,%)	p	Performing (n,%)	Not performing (n,%)	p	Performing (n,%)	Not performing (n,%)		Performing (n,%)	Not performing (n,%)	p
Gender												
Male	68(81.9)	15(18.1)	0.010*	51(61.4)	32(38.6)	0.204	37 (44.6)	46(55.4)	0.109	27 (32.5)	56(67.5)	0.001*
Female	162(92.6)	13(7.4)		122(69.7)	53(30.3)		98 (56.0)	77(44.0)		98 (56.0)	77(44.0)	
Highest degree												
MD/MBBS	106(96.4)	4(3.6%)	<0.001*	82(74.5)	28(25.5)	0.007*	54(49.1)	56(50.9)	0.625	62(56.4)	48(43.6)	0.029*
MOG/MRCOG	93(87.7)	13(12.3)		71(67.0)	35(33.0)		57(53.8)	49(46.2)		41(38.7)	65(61.3)	
Subspecialty-trained	31(73.8)	11(26.2)		20(47.6)	22(52.4)		24(57.1)	18(42.9)		22(52.4)	20(47.6)	
First degree obtained												
Local (Malaysia)	146(89.6)	17(10.4)	0.775	109(66.9)	54(33.1)	0.935	86(52.8)	77(47.2)	0.855	80(49.1)	83(50.9)	0.791
Overseas	84(88.4)	11(11.6)		64(67.4)	31(32.6)		49(51.6)	46(48.4)		45(47.4)	50(52.6)	

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Current place of practice											
Public	189(95.9)	8(4.1)	0.000*	147(74.6)	50(25.4)	0.000*	102(51.8)	95(48.2)	0.751	109(55.3)	88(44.7)	0.000*
Private	41(67.2)	20(32.8)		26(42.6)	35(57.4)		33(54.1)	28(45.9)		16(26.2)	45(73.8)	
Duration of working in obstetrics field												
≤10 years	115(95.0)	6 (5.0)	0.004*	89(73.6)	32(26.4)	0.037*	59(48.8)	62(51.2)	0.281	70(57.9)	51(42.1)	0.005*
>10 years	115(83.9)	22(16.1)		84(61.3)	53(38.7)		76(55.5)	61(44.5)		55(40.1)	82(59.9)	
Current post												
Junior€	110(96.5)	4(3.5)	0.001*	87(76.3)	27(23.7)	0.005*	55(48.2)	59(51.8)	0.243	66(57.9)	48(42.1)	0.007*
Senior¥	120(83.3)	24(16.7)		86(59.7)	58(40.3)		80(55.6)	64(44.4)		59(41.0)	85(59.0)	

Junior€ : House officers and medical officers
Senior¥ : Specialists and consultants

Table 4 The difference between mean age for those performing and not performing clinical fundal height assessment

Examination	Mean age (years old) of those performing	Mean age (years old) of those not performing	sd	95% CI	p
Clinical fundal height assessment	38.78	39.86	10.119	37.46 – 40.09	<0.001*
Symphysis-fundal height assessment	38.82	41.96	10.282	37.28 – 40.36	0.030*
Landmark method	40.81	38.81	10.118	39.09 – 42.53	0.145
Finger method	36.74	42.78	9.027	35.15 – 38.34	<0.001*

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DISCUSSION

In this study, 230 (89.1%) participants measured fundal height clinically in their daily practice, and out of those 230 participants, there were 167 (72.6%) participants practising SFH measurement. Even though SFH is recommended by mainstream guidelines such as the Royal College of Obstetrics and Gynaecologist Greentop guideline [7] and the American College of Obstetricians and Gynaecologists guideline [8], there are still a quarter of participants in this study who do not practice it.

SFH has been the recommended method mainly because it is more objective and reproducible. Early studies recommended SFH after they found its sensitivities range from 56-86% and specificities of 80-93% for identifying SGA [9-11]. The readings should be plotted on a customised SFH chart to improve the detection of growth-restricted fetuses [2,7,8,12]. However, there were other studies with conflicting findings. One study demonstrated that SFH has limited value in predicting SGA neonates with a sensitivity of 27% and specificity of 88% [13]. Rosenberg, K. et al. also found that SFH was not useful as it missed half of the growth-restricted fetuses [14]. Furthermore, maternal obesity, abnormal fetal lie, large fibroids, hydramnios, and fetal head engagement further contribute to the limited predictive accuracy of SFH measurement [7].

This study demonstrates that the majority (91.8%) of participants agreed that estimating fundal height clinically is important and despite lack of evidence and standardised technique, 230 (89.1%) participants agreed that it should continue to be taught to medical students. On top of that, 189 (73.3%) and 155 (60.1%) participants felt that SFH should be supplemented with the landmark method and finger method respectively. The conflicting evidence on SFH efficacy [13-14] possibly explains why most participants feel that SFH alone is inadequate and, hence needs to be supplemented with either the landmark or finger method.

In fact, this survey demonstrated that the majority agreed that all three methods should be taught to medical students. However, the lack of standardised techniques in performing the landmark and finger methods, which may vary among the performing doctors poses a challenge in teaching them to medical students. This needs to be overcome to ensure that this clinical skill will continue being practised and to avoid over-reliance on ultrasound measurement, particularly in low-risk cases. Unfortunately, to date, there are no literature that describes the standardisation of these techniques.

Among those who practise clinical fundal height measurement, this study found that 53.5% of doctors are practising the landmark method and 50.4% are practising the finger method. However, there is no published literature that compares the sensitivity and specificity between these two techniques. These techniques were passed down from earlier generations mainly through apprenticeship, rather than a prescribed description in the textbook or any clinical practice guidelines.

To the best of our knowledge, there was only one study performed on abdominal palpation using an anatomical landmark, however, there is no exact description of how it was done [5]. However, the findings on the usefulness of abdominal palpation in estimating fundal height were disappointing as well. In low-risk populations and mixed-risk populations, they have consistently shown abdominal palpation to be of limited sensitivity (19-44%) in the detection of an SGA and severe SGA [5]. In high-risk populations, its sensitivity increases to 37% for detection of SGA and 53% for severe SGA [5].

Hence no conclusion can be made on which method is superior until high-quality data from a randomised control trial comparing the two techniques with SFH and ultrasound measurement as the standard assessment is available.

The concern about potentially wide intra-observer and inter-observer variability in performing all the methods of assessing fundal height clinically remains valid and has been a subject in a few studies [6, 15]. Healthcare practitioners exhibit bias in their assessments of fundal height. They are often influenced by their awareness of gestational age and reliance on a marked measuring tape. This inclination becomes more pronounced in cases of elevated patient BMI and when the healthcare provider has less experience [15]. Even for a well-described SFH technique, there was considerable variation in the techniques employed for

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measuring SFH, contributing to an increase in interobserver errors [6].

To date, there was only one study comparing SFH and abdominal palpation using an anatomical landmark. This has been done in Denmark involving 1639 pregnant women, and they found that there were no significant differences between the two groups in terms of the number of interventions, additional diagnostic procedures required, or the neonatal outcome [16]. This study has been included in the Cochrane Database of Systemic Reviews which has concluded that the evidence is not sufficient to determine that SFH measurement is more superior and effective in detecting IUGR compared to abdominal palpation [15]. Not only that, serial plotting of SFH and estimated fetal weight (EFW) measurements on customised growth charts did not improve the antenatal detection of fetal growth restriction in a recent cluster randomised control trial [17]. Hence, currently, there is no recommendation to change the method of fundal height assessment from what is usually practised by each practitioner [18]. This could explain why most participants continue practising the landmark and finger methods.

This study also demonstrates a significant relationship between the practice of clinical fundal height assessment, SFH measurement, and finger method with certain demographic factors. Interestingly, the practice (except for the landmark method) was significantly lesser among those who have worked for more than ten years, and the seniors (specialists and consultants). There are few postulations for this observation such as both SFH and finger method are more time-consuming than the landmark method, or the readily available ultrasound to measure the fetal growth parameters. On the contrary, Griffith et al. found that SFH assessment is significantly more among those who have worked for more than ten years [6]. This discrepancy is potentially due to differences in the studied population, as midwives are also included in the study done by Griffith et al. Midwives are potentially more likely to practise SFH that is more objective and described in the textbooks and guidelines.

The limitation of this study was the findings depend solely on the participants' responses to the questions given in the questionnaire. It is not feasible to verify whether their response genuinely reflects their personal practice. Apart from that, due to the difficulty of obtaining adequate responses from the OGSM members, the study questionnaires were shared with the departments of Obstetrics and Gynaecology in hospitals nationwide, and recruitment was carried out through convenience sampling. Hence, a larger sample would be more representative of the attitude and practice of clinical fundal height measurement in Malaysia. However, despite a smaller sample size, this study's findings are still able to give some insight into this issue.

Considering the majority of obstetric practitioners agree that clinical fundal height assessment is important and should be taught to medical students, there is a definitive need to determine the sensitivity and specificity of the clearly described landmark method and finger methods for clinical fundal height assessment. A randomised controlled trial comparing the landmark method, finger method, and SFH to the ultrasound measurement of the fetal growth parameters is essential to shed light on this obstetrics abdominal examination conundrum.

CONCLUSION

The majority of obstetrics practitioners agree that clinical fundal height assessment is important and perform it in their daily practice, however, the methods used vary.

Conflict of interest

Authors declare none.

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Authors' Contribution

Conception or design of the work – Bahiyah Abdullah, Mohamad Rodi Isa

Data collection – Farhana Parai, Siti Masyitah Domadi,

Data analysis and interpretation – Farhana Parai, Siti Masyitah Domadi, Mohamad Rodi Isa

Writing the article – Nadzratulaiman Wan Nordin, Bahiyah Abdullah.

All authors read and approved the final manuscript.

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