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Knowledge, Attitude and Practice Regarding Diabetic Retinopathy Screening Among Primary Health Care Workers in District Health Care Centers in Terengganu

***Abstract* – Introduction:** Diabetic retinopathy (DR) is one of the main causes of avoidable blindness among diabetes patients. The role of primary health care workers (PHCWs) as the spearhead in primary care is important to prevent visual impairment and blindness due to diabetic retinopathy by early detection. **Purpose**: To assess the knowledge, attitude, practice among PHCWs in the district health care centers in Terengganu. **Method**: This analytical cross-sectional study, which utilized a questionnaire, was conducted in two phases from 1 January 2022 to 30 November 2022. Phase I took place online and focused on the creation and validation of a questionnaire assessing knowledge, attitudes, and practices related to diabetic retinopathy screening among PHCWs which was later used in phase II. Phase II involved participation of PHCWs in self-filling questionnaire regarding KAP on DR screening. **Results:** Of the 118 PHCWs in this study, 92 (92%) respondents were female and 26 (22%) were male. The mean age of the study group was 32.75 ± 4.4 years (range 27-52). 42.4% had high level of knowledge with 31 senior PHCWs compared to 19 junior PHCWs scoring high level. About 23.7% had good practice with 17 senior PHCWs exhibiting it compared to 11 junior PHCWs. Our study reported that they had good knowledge of the relationship between DR and other end organs affected by microvascular complications. Our study participants showed positive attitude with 94.9% of the participants disagree that eye examination is only required in diabetic patients when vision is affected with 32.2% referring their diabetic patients to an ophthalmologist. **Conclusion:** DR screening among PHCWs in this study was suboptimal which prompts the need for improved training of PHCWs in managing DR patients in a bid to strengthen DR screening and reduce the burden of visual impairment in Malaysia.

***Keywords* –** *Diabetic retinopathy, knowledge, attitude, practices, primary care*

1 INTRODUCTION

Diabetes mellitus has emerged as a pervasive global public health challenge, exacerbated by the dramatic increase in obesity rates and the widespread effects of industrialization (1). This has led to its classification as a global epidemic, particularly impacting developing nations, and imposing substantial burdens on both public health and socioeconomic development (2).

The global prevalence of diabetes in 2002 was estimated to be 2.8% and is projected to rise 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 (3). Malaysia in particular, grapples with one of the highest diabetes prevalence rates globally, ranging between 7.3% and 23.8%. Despite efforts to address this epidemic, including public health initiatives, the incidence of diabetes continues to climb in both developing and developed countries (4, 5). While diabetes incidence has seen a decline in certain regions, the prevalence of the condition has surged in both developing and developed countries over the past few decades (6, 7).

DR is a common complication of diabetes mellitus (8, 9). It is the leading cause of blindness in the working-aged group people (10, 11) and is the cause of blindness in 10.4% of elderly population as seen in the National Eye Survey in Malaysia (12). The National Diabetic Registry was established in 2006 with the aim of accurately quantifying the prevalence of DR in various communities. Globally, the prevalence of DR among individuals with diabetes is reported at 34.6% (13). In Malaysia, the prevalence differs, standing at 12.3% for type 1 diabetes mellitus and 22.3% for type 2 diabetes mellitus (1).

Currently, there is lack of study on knowledge, attitude and practice regarding DR screening among PHCWs in Malaysia. Hence, this study aims to develop and validate a KAP questionnaire and evaluate how well PHCW understand diabetic retinopathy, its risk factors, and the importance of early detection. Understanding the current knowledge base helps identify gaps that may need to be addressed through targeted education.

2 MATERIALS AND METHODS

This is a cross-sectional study that was conducted in two phases between 1st January 2022 until 30th November 2022. Phase I involved the development and validation of the questionnaire online by 10 experts all over Malaysia (4 Ophthalmologists, 4 Family Medicine Specialists, and 2 senior General Practitioners with experience of more than 10 years) while phase II was a cross-sectional multicentered study using the validated questionnaire as a self-administered hard copy survey among PHCWs at 7 district health care centers which were Clinic Hiliran, Clinic Chendering, Clinic Manir, Clinic Batu Rakit, Clinic Bukit Tunggal, Clinic Seberang Takir and Clinic Ibu dan Anak. This study received ethical approval from the Research and Ethical Committee, School of Medical Sciences, Universiti Sains Malaysia (USM/JEPeM/22050312).

Inclusion criteria include PHCWs who completed houseman ship training with at least one year service in district health center (permanent/contact medical officers) and is serving in one of the listed health care centers. The study excluded Family Medicine Specialist, PHCWs who are on leave or not available on the day of data collection, and PHCWs with less than 1 year of service in the listed health care centers.

The development and validation of items for the questionnaire involved a detailed four stages. In the first stage, items were generated through an extensive literature review with expert brainstorming sessions based on the Malaysian DR clinical practice guidelines. The second stage centered on evaluating the content validity of the questionnaire by having a panel of expert reviewers, assessing the draft and making adjustments based on their feedback. The third stage involved testing the face validity of the revised questionnaire through a pilot test. The final stage involved assessing the construct validity and reliability.

2.1 Stage 1: Item Generation

A comprehensive review of literature was conducted to define the construct that is of interest and obtaining the available questionnaire based on the Malaysian DR Clinical Practice Guidelines. Domain 1 was about knowledge on when to screen and follow-up on DR screening with 30 items evaluated. Domain 2 concerned with attitude of PHCWs towards DR screening with 11 items and lastly domain 3 was dedicated on practice of eye screening among PHCWs with 15 items analyzed.

2.2 Stage 2: Content Validity

The questionnaires were administered to 10 experts. The panel of experts were asked to assess the extent of relevancy and representativeness of each element to the subtheme under observation. The evaluation was carried out utilizing the Likert Scale, a measuring tool that ranges from zero, signifying a lack of relevancy or representation, to four, indicating a high level of relevancy or representation.

To allow objective assessments of the content evidence, the item-level content validity index (I-CVI) and scale-level content validity index averaging (S-CVI/Ave) method proposed by Polit et al. were modified from categorical into numerical indices. I-CVI was gauged by calculating the mean relevancy score of each item (I-CVI = sum of the relevancy score of each item divided by the number of experts); the S-CVI/Ave was determined by dividing the sum of I-CVI by the total number of items (S-CVI/Ave = [summation of all I-CVI]/ [number of items]).

Since there were more than nine experts involved in the evaluation, the lower limit of the acceptable value for both I-CVI and S-CVI/Ave was at least 0.78 (14). Items with an I-CVI score less than 0.78 were supposed to be removed from the list and the remaining items underwent response process validity evaluation. Based on the result of the content validity evaluation, all items have achieved satisfactory level of content validity (I-CVI and S-CVI/Ave > 0.78) and therefore included in the response process validity evaluation for the clarity of the language used to describe the items. They are shown in Table 1.

2.3 Stage 3: Face Validity

Thirty-two raters were selected from the expected respondents was conducted via online approach. The lower limit of the acceptable value for both I-FVI and S-FVI/Ave were at least 0.80 (15, 16).

Table 1. Socio-demographic characteristics of respondents (n=118)

Variables	n (%)	Mean(SD)
Age (Range in years) *	27-52	32.75 (4.40)
Gender		
Male	26 (22.0)	
Female	92 (78.0)	
Number of years of services		
Junior	54 (45.8)	
Senior	64 (54.2)	
Number of diabetic patients seen a day		
>30 patients	5 (4.2)	
20-30 patients	17 (14.4)	
10-20 patients	81 (68.8)	
<10 patients	15 (12.7)	

Table 2. Knowledge, attitude and practice on DR screening among PHCWs

Domain	Junior PCHWs			Senior PHCWs			Total PHCWs			p-value
	Mean (SD)	Score		Mean (SD)	Score		Mean (SD)	Score		
		Min	Max		Min	Max		Min	Max	
Total knowledge	13.50(2.18)	5	7	14.28(1.71)	7	17	13.92(1.97)	5	17	0.038
Total attitude	5.74(1.39)	2	9	5.83(1.39)	2	9	5.79(1.38)	2	9	0.574
Total practice	6.35(1.54)	3	9	6.39(1.55)	3	9	6.37(1.54)	3	9	0.914

Table 3. Comparison of the level of knowledge, attitude and practice between Junior and Senior PHCWs

Domains	Level (n=118)	Junior		Senior		Total		p-value*
		n	%	N	%	n	%	
Knowledge	**Low**	5	9.3	1	1.6	6	5.1	0.038
	Moderate	30	55.6	32	50.0	62	52.5	
	High	19	35.2	31	48.4	50	42.4	
	Mean (SD)	2.26 (0.62)		2.47 (0.53)		2.37 (0.58)		
Attitude	**Negative**	23	42.6	24	37.5	47	39.8	0.574
	Neutral	24	44.4	35	54.7	59	50.0	
	Positive	7	13.0	5	7.8	12	10.2	
	Mean (SD)	1.70 (0.69)		1.70 (0.61)		1.70 (0.65)		
Practice	**Poor**	15	27.8	17	26.6	32	27.1	0.914
	Fair	28	51.9	30	46.9	58	49.2	
	Good	11	20.4	17	26.6	28	23.7	
	Mean (SD)	1.93 (0.70)		2.00 (0.74)		1.97 (0.72)		

Table 4. Factors affecting knowledge between Junior and Senior PHCWs regarding screening for DR

Variables	Simple Linear Regression			Multiple Linear Regression		
	Crude b	95% CI	p-value[a]	Adjusted b	95% CI	p-value
Age	0.04	-0.05,0.12	0.373	0.02	-0.13,0.18	0.772
Gender						
Male	1			1		
Female	0.79	-0.07,1.65	**0.071***	0.86	0.01,1.71	**0.048***
Years of practice						
< 5	1			1		
≥ 5	0.43	-0.36,1.21	0.28	0.16	-1.42,1.75	0.839
Special Diabetic Clinic						
Yes	1			1		
No	-0.12	-0.87,0.64	0.76	-0.10	-1.11,0.89	0.837
Number of diabetic patients seen in a day						
≤ 20	1			1		
>21	0.02	-0.53,0.57	0.95	0.37	-0.42,1.15	0.359
Screening tools						
Direct ophthalmoscope	1			1		
Fundus Camera	0.22	-2.22,2.65	0.86	0.41	-2.09,2.92	0.743
Past DR training						
Yes	1			1		
No	-0.59	-1.20,0.02	**0.06***	-0.64	-1.24,-0.04	**0.038***
Last DR talk/webinar (years)						
< 2	1			1		
≥ 2	-0.40	-0.88.0.07	0.96	-0.35	-1.00,0.31	0.296

Table 5. Factors affecting attitude between Junior and Senior PHCWs regarding screening for diabetic retinopathy

Variables	Simple Linear Regression			Multiple Linear Regression		
	Crude b	95% CI	p-value[a]	Adjusted b	95% CI	p-value
Age	-0.02	-0.08,0.04	0.478	-0.04	-0.14,0.06	0.424
Gender						
Male	1			1		
Female	0.42	-0.19,1.03	0.174	0.50	-0.10,1.10	0.102
Years of practice						
< 5	1			1		
≥ 5	-0.19	-0.75,0.36	0.490	0.48	-0.47,1.43	0.319
Special Diabetic Clinic						
Yes	1			1		
No	0.49	-0.48,0.58	0.855	-0.21	-0.81,0.39	0.495
Number of diabetic patients seen in a day						
≤ 20	1			1		
>21	-0.30	-0.69,0.77	0.117	-0.35	-0.73,0.03	0.071
Screening tools						
Direct ophthalmoscope	1			1		
Fundus Camera	0.51	-0.96,1.99	0.490	0.50	-1.01,2.01	0.512
Past DR training						
Yes	1			1		
No	-0.29	-0.72,0.14	0.183	-0.34	-0.77,0.08	0.115
Last DR talk/webinar (years)						
< 2	1			1		
≥ 2	-0.57	-0.39,0.28	0.738	0.07	-0.32,0.47	0.719

Table 6. Factors affecting practice between Junior and Senior PHCWs regarding screening for diabetic retinopathy

Variables	Simple Linear Regression			Multiple Linear Regression		
	Crude b	95% CI	p-value[a]	Adjusted b	95% CI	p-value
Age	-0.02	-0.09,0.04	0.503	-0.02	-0.14,0.09	0.682
Gender						
Male	1			1		
Female	0.23	-0.45,0.91	0.501	0.07	-0.80,0.93	0.879
Years of practice						
<5	1			1		
≥ 5	-0.10	-0.72,0.52	0.749	0.18	-0.96,1.31	0.757
Special Diabetic Clinic						
Yes	1			1		
No	0.05	-0.54,0.64	0.872	0.09	-0.63,0.81	0.800
Number of diabetic patients seen in a day						
≤ 20	1			1		
>21	-0.27	-0.69,0.16	0.221	-0.30	-0.72,0.12	0.165
Screening tools						
Direct ophthalmoscope	1			1		
Fundus Camera	0.76	-0.99,2.50	0.392	0.65	-1.18,2.47	0.481
Past DR training						
Yes	1			1		
No	-0.55	-1.02,-0.07	**0.024***	-0.57	-1.04,-0.09	**0.019***
Last DR talk/webinar (years)						
< 2	1			1		
≥ 2	0.17	-0.21,0.54	0.384	0.27	-0.21,0.74	0.266

Based on the calculations in Table 2, it can be concluded that I-FVI, and S-FVI/Ave meet satisfactory level, and thus the scale of questionnaire has achieved satisfactory level of response process validity.

2.4 Stage 4: Reliability of the Questionnaire

The responses of the questionnaires were analyzed for internal consistency reliability using Cronbach's alpha coefficient with the selection of a cut-off point of 0.7. There were no items removed from the first domain, 2 items removed from the second domain and 1 item removed from the third domain. After modification, the questionnaire was administered for the second time and the total Cronbach's alpha was 0.72 which was deemed acceptable and relevant.

The participants received prior notification of data collection. Before starting the study, participants were informed about their full right to refuse. Written informed consent was obtained from all who participated in the survey. During data collection, reasonable physical distance was kept between the participants and the principal investigator. The data was collected in a private condition and keep confidential. Clear instructions on how to complete the questionnaire were given and they were requested to complete the questionnaire without consulting any document.

In order to minimize the errors while conducting the study, certain measures were taken such as only PHCWs that fulfill the selection criteria were included in the study, usage of a valid and reliable questionnaire, emphasis on privacy and confidentiality and ensure adequate time for answering the questionnaire. Each participant was given 45 minutes to answer the whole questionnaire.

The overall data collection process was coordinated and supervised by the principal investigator. The filled questionnaires were checked by the principal investigator for completeness and consistency of responses. A total of 118 participants were recruited with two PHCWs excluded from the study as they were not physically present during data collection due to health issues. Data analysis was performed using the Statistical Package for the Social Sciences (SPSS). Double data entry was practiced preventing missing data or wrong entry.

The knowledge, attitude and practice were categorized using Bloom's cut-off point (17). Overall knowledge was categorized as high level if the score was between 80 and 100%, moderate level if the score was between 60 and 79%, and low level if the score was less than 60%. The overall attitude was categorized as positive if the score was between 80 and 100%, neutral if the score was between 60 and 79%, and negative if the score was less than 60%. The overall practice score was categorized as good if the score will be between 80 and 100%, fair if the score will be between 60 and 79%, and poor if the score will be less than 60%.

3 RESULTS

A total of 120 PHCWs who fulfilled the selection criteria were invited to participate in this questionnaire. However, only 118 subjects responded (98.3%) and completed the survey. The age of the subjects ranged between 27-52 years with a mean of 32.8 (4.4) years. There were 26 (22%) male and 92 (78%) female. 54 (45.8%) junior PHCWs with 5 years or less experience and 64 (54.2%) senior PHCWs with more than 5 years of experience. The mean number of experiences as a PHCWs was 6.1 (4.2) years. Table 1 provides the socio demographic characteristics of our respondents.

Among the 118 respondents, the mean (SD) of total knowledge score was 13.92 (1.97) [95% CI: 13.56, 14.28] with a minimum score of 5 and maximum score of 17. Among the junior PHCWs mean knowledge was 13.50 (2.18) [95% CI: 12.91, 14.09] with a minimum score of 5 and maximum score of 17 while among senior PHCWs, the mean was 14.28 (1.71) [95% CI: 13.85, 14.71] with a minimum score of 7 and maximum score of 17. There was statistically significant difference of p-value <0.038. The mean (SD) of the total attitude score was 5.79 (1.38) [95% CI: 5.54, 6.04] with a minimum score of 2 and maximum score of 9 with junior PHCWs having 5.74 (1.39) [95%CI: 5.36, 6.12] and a minimum score of 2 and maximum score of 9. However, among senior PHCWs mean attitude was 5.83 (1.39) [95% CI: 5.48, 6.17] with a minimum score of 2 and maximum score of 9. Mean (SD) of the total practice score was 6.37 (1.54) [95% CI: 6.09, 6.65] with a minimum score of 3 and maximum score of 9 with junior PHCWs having 6.35 (1.54) [95% CI: 5.93, 6.79] with a minimum score of 3 and maximum score of 9. Among senior PHCWs, the mean practice was 6.39 (1.55) [95% CI: 6.00, 6.78] with a minimum score of 3 and maximum score of 9. The knowledge, attitude and practice on DR screening among PHCWs is demonstrated in Table 2.

For the mean (SD) of knowledge category there were 6 (5.1%) respondents with low knowledge, 62 (52.5%) moderate knowledge and 50 (42.4%)

with high knowledge. Among junior PHCWs, 5 (9.3%) had low knowledge, 30 (55.6%) moderate knowledge and 19 (35.2%) had high knowledge while among senior PHCWs, there was 1 (1.6%) with low knowledge, 32 (50.0%) moderate knowledge and 31 (48.4%) with high knowledge. For attitude category among the senior PHCWs, there was 24 (37.5%) with negative attitude, 35(54.7%) neutral attitude and 5 (7.8%) positive attitudes while among the junior PHCWs there was 23 (42.6%) with negative attitude, 24 (44.4%) neutral attitude and 7 (13.0%) with positive attitude. For practice category among junior PHCWs, there was 15 (27.8%) with poor practice, 28 (51.9%) with fair practice and 11 (20.4%) with good practice while among the senior PHCWs, there was 17 (26.6%) with poor practice, 30 (46.9%) with fair practice and 17 (26.6%) with good practice. Table 3 shows the comparison of the level of knowledge, attitude and practice among PHCWs regarding DR screening.

Simple linear regression was done for factors affecting knowledge on DR screening among PHCWs, with two significant factors which were gender and past DR training. Multiple linear regression analysis showed statistically significant association with gender (Adjusted b = 0.87, 95% CI = 0.01, 1.71, p-value = 0.048) and past DR training (Adjusted b = -0.64, 95% CI = -1.24, -0.04, p-value = 0.038). Multiple linear regression was done for three factors selected regarding outcome attitude among PHCWs however, there was no statistically significant risk factors for this outcome p-value >0.05. For factors affecting practice on DR screening among PHCWs, only one significant risk factor in multiple linear regression that was past DR training (Adjusted b = -0.57, 95% CI = -1.04, 0.09, p-value = 0.019). Table 4, 5 and 6 demonstrate the factors affecting knowledge, attitude and practice among PHCWs regarding DR screening.

4 DISCUSSIONS

Our study reported that among all participants, there was a significant difference between knowledge on screening for DR in type 1 and type 2 diabetes. In our study, 89.8% PHCWs correctly screened their patients with type 2 DM at the time of diagnosis for DR versus only 37.3% who correctly screened their patients with type 1 DM for DR. This difference can be attributed to the fact that PHCWs encounter more patients with type 2 DM than type 1 on a daily basis compared to type 1 DM patients which are usually followed up by endocrinologist in tertiary hospitals. Our results were similar to the findings of Preti et al. study done in São Paulo Brazil among 138 participants, who reported correct referral rates of 36.9% and 86.9% for type 1 and type 2 diabetes respectively (18). Similarly, Al-Rasheed et al. study done in Riyadh Saudi Arabia among 216 doctors, reported a correct referral rate of 24% for type 1 diabetes versus 71% for type 2 diabetics (19).

When comparing junior and senior PHCWs in our study in terms of correctly referring DR patients, the correct referral was more frequent among senior PHCWs (89.8%) compared to junior PHCWs (62.7%). However, this is in contrast to Preti et.al study where correct referral was more frequent in junior PHCWs (54.8%) compared to senior PHCWs (22.1%). This is most probably because senior PHCWs generally have more years of experience in clinical practice, which allows them to better recognize the signs and symptoms of diabetic retinopathy. Their experience with a larger number of cases improves their ability to make accurate referrals. Over time, senior doctors develop better pattern recognition skills, enabling them to identify subtle indicators of diabetic retinopathy that might be missed by less experienced doctors. This skill is crucial in making correct referrals.

We found that our PHCWs have good knowledge of the relationship between DR and other end organs affected by microvascular complications. Hence, they are likely to refer all patients with renal disease or diabetic foot for eye examination because this could indicate the presence of DR or vice versa. A study conducted in Khartoum, Sudan by Elnagieb et al. among 225 doctors also found almost similar results, where 89.0% of participants knew that DR and nephropathy respectively are microvascular complications in patients with diabetes (20).

In our study, 80.5% PHCWs knew that pregnancy can worsen DR and 74.6% know that DM in pregnancy should be screened every 3 monthly. This is in accordance with other studies conducted in Saudi Arabia in which 33% of PHCWs have recognized pregnancy as a risk factor for the development of DR (19, 21). Regarding factors that affect the severity of DR, 100% of our study participants mentioned poor glucose control, 79.7% mentioned duration of DM while 90.7% said poorly controlled hypertension. This is similar with Elnagieb et al. study where 68.0% respondents mentioned poor glucose control, followed by 34.0% respondents for duration of DM, high blood pressure 32.4% responders. The high score among our PHCWs

could be because they have high competency level from continuous engagement in medical education activities such as workshops, seminars, and online courses. These sessions often include updates on the latest research, guidelines, and best practices for managing DR. We found that 66.9% of our participants are willing to be trained for DR screening courses. Continuous education and skill development are vital for doctors to stay current with medical advancements. DR training programs provide them with the latest knowledge and techniques in the field, ensuring they remain at the forefront of patient care.

Our study PHCWs showed positive attitude with 94.9% of our participants disagree that eye examination is only required in diabetic patients when vision is affected. This is almost similar to Elnagieb et al. study with 75% of their participants (20). However, in Lestari et al. study which was done among 92 doctors in Jakarta, Indonesia admitted to not performing ophthalmic examination themselves because they assume that ophthalmologist is more suited to perform this task with a better outcome hence the higher referral rate in her study. Onyiaorah et al. conducted a study among general practitioners in Nigeria and found out that only 4.6% of their study doctors examined the eyes of all of their patients. (22, 23). 32.2% of our study participants refer their diabetic patients to an ophthalmologist in comparison to Lestari et.al study where significantly 70.7% of their participants refer to ophthalmologist. The low rate of referral in our study could be because our patients may be discouraged from visiting ophthalmologist for reasons of high number of patients in the tertiary hospitals causing long waiting time. Besides that, our patients are mostly from low to middle-income families in the suburban areas. Hence, they have to fork out money for every visit to travel to the city center.

Our study revealed poor level of practice in our study with only 34.7% participants confident in retinal examination in contrast to Al-ghamdi et al. study which was done in Saudi Arabia with 180 respondents. In his study, 43.9% of the participants were confident to do retinal examination to find DR changes with a direct ophthalmoscope (24). In our study, 36.4% of our PHCWs claim that direct ophthalmoscope is a good screening tool but only 23.7% of our PHCWs use direct ophthalmoscope which was also seen in a study among 115 general practitioners in Bandung, Indonesia by Ratnaningsih et al. where 93% never performed a funduscopic examination (25). This could be because direct ophthalmoscope requires careful and precise approach to get a clear view of the retina. This process can be time-consuming, especially for those who are not accustomed to using it regularly. In a busy clinical setting, where time efficiency is crucial, some practitioners might opt for other tools or methods that they find quicker or easier to use. In our study, the length of time since graduation of our PHCWs did not significantly correlate with experience with fundus examination or with the frequency of performing fundoscopy in daily practice which is similar to Preti et al. study (18). This is most probably because of lack of training in using a direct ophthalmoscope among PHCWs irrespective of the duration of service.

A higher knowledge among female compared to males was demonstrated in our study. Research has shown that females often pay closer attention to detailed aspects of patient care, which can lead to better knowledge and application of guidelines related to diabetes management. Female doctors are also often noted for their strong communication skills and empathetic approach, which can enhance their patient interactions and improve their understanding and management of diabetes. In contrast to the study by Alhejji et al. and Al-Rasheed et al. which showed no significant difference between male and females (26, 19).

The strength of our study lies in its multicenter design. In addition, our study pioneered a pilot study which is not available in Malaysia. Limitation of our study is the small sample size and hence future research could address this by including a larger sample and expanding the sociodemographic data, which would provide a more nuanced understanding of how various factors might influence the questionnaire outcomes.

5 CONCLUSIONS

The level of knowledge, attitude and practice of our study PHCWs was suboptimal. Although most were aware of the effective method of delaying onset of DR and the frequency of eye examination, only few were able to detect retinal changes on fundoscopy with confidence. This prompts the need for improved training in a bid to strengthen DR screening and reduce the burden of visual impairment.

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