Al-Rafidain J Med Sci. 2026;10(1):109-114.
DOI: https://doi.org/10.54133/ajms.v10i1.2645

AJMS

Online ISSN (3219-2789)

Research Article

Knowledge, Attitude and Practice about Retinopathy of Prematurity among Physicians in Primary Healthcare Settings in Baghdad 2025

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Received: 1 December 2025; Revised: 14 January 2026; Accepted: 20 January 2026

Abstract

Background: Retinopathy of prematurity (ROP) is a preventable cause of childhood blindness, and early screening of at-risk infants is essential for reducing severity. PHC physicians' knowledge of ROP risk factors and screening guidelines, attitudes toward the importance of early detection, and clinical practices related to referral and parental counseling are important for effective prevention. ***Objectives***: To assess the knowledge, attitude, and practice (KAP) regarding ROP among physicians working in PHC centers in Baghdad, and to examine the influence of selected demographic factors on KAP. ***Methods***: A cross-sectional study was conducted among PHC physicians in Al-Karkh and Al-Rusafa sectors in Baghdad from January to December 2025. A multistage sampling method was applied to select sectors and centers; all eligible physicians in selected centers were invited to participate. Data were collected using a self-administered questionnaire covering demographics and KAP domains. Pearson's chi-square or Fischer exact tests were used to assess associations between demographic variables and KAP levels. ***Results***: 286 physicians participated. Knowledge levels were predominantly fair (43.0%), while only 21.0% demonstrated good knowledge. Attitudes were mainly neutral (72.4%), with only 3.8% showing positive attitudes. Regarding practice, 77.6% demonstrated it was fair and 14.3% good. Academic level and medical specialty were significantly associated with knowledge, while age and specialty were associated with attitudes. Age and participation in educational activities were significantly associated with practice levels. ***Conclusions***: Most physicians exhibited inadequate knowledge and predominantly neutral attitudes toward ROP, and practice levels were generally fair.

Keywords: Attitude; Knowledge; Practice; Retinopathy of prematurity.

المعرفة والموقف والممارسة حول اعتلال الشبكية المبكر لدى الخدج بين الأطباء في مراكز الرعاية الصحية الأولية في بغداد 2025

الخلاصة

الخلفية: اعتلال الشبكية المبكر (ROP) هو سبب يمكن الوقاية منه للعمى في الطفولة، والفحص المبكر للرضع المعرضين للخطر ضروري لتقليل الشدة. معرفة أطباء مركز الرعاية الصحية العامة بعوامل الخطر في الكشف المبكر وإرشادات الفحص، ومواقفهم تجاه أهمية الكشف المبكر، والممارسات السريرية المتعلقة بالإحالة والاستشارات الأبوية، كلها عوامل مهمة للوقاية الفعالة. **الأهداف**: تقييم المعرفة والموقف والممارسة (KAP) المتعلقة ب ROP بين الأطباء العاملين في مراكز الرعاية الصحية العامة في بغداد، وفحص تأثير العوامل الديموغرافية المختارة على KAP. **الطرائق**: أجريت دراسة مقطعية بين أطباء الرعاية الصحية في قطاعي الكرخ والرصافة في بغداد من يناير إلى ديسمبر 2025. تم تطبيق طريقة أخذ عينات متعددة المراحل على قطاعات ومراكز محددة؛ تمت دعوة جميع الأطباء المؤهلين في مراكز مختارة للمشاركة. تم جمع البيانات باستخدام استبيان ذاتي يغطي الديموغرافيا ومجالات KAP. تم استخدام اختبارات بيرسون الدقيقة للكاي مربع أو فيشر لتقييم الارتباطات بين المتغيرات الديموغرافية ومستويات KAP. **النتائج:** شارك 286 طبيبا. كانت مستويات المعرفة عادلة في الغالب (43.0٪)، بينما أظهر 21.0٪ فقط معرفة جيدة. كانت المواقف محايدة بشكل رئيسي (72.4٪)، حيث أظهر 3.8٪ فقط مواقف إيجابية. فيما يتعلق بالممارسة، أظهر 77.6٪ أداء عادلا و14.3٪ جيدا. كان المستوى الأكاديمي والتخصص الطبي مرتبطين بشكل كبير بالمعرفة، بينما ارتبط العمر والتخصص بالمواقف. كان العمر والمشاركة في الأنشطة التعليمية مرتبطين بشكل كبير بمستويات الممارسة. **الاستنتاجات**: أظهر معظم الأطباء معرفة غير كافية ومواقف محايدة في الغالب تجاه ROP، وكانت مستويات الممارسة عادلة عموما.

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Article citation: Hamad MN, Abdulghafor YA. Knowledge, Attitude and Practice about Retinopathy of Prematurity among Physicians in Primary Healthcare Settings in Baghdad 2025. *Al-Rafidain J Med Sci.* 2026;10(1):108-114. doi: https://doi.org/10.54133/ajms.v10i1.2645

INTRODUCTION

Retinopathy of Prematurity (ROP) is a serious eye condition that affects premature infants, particularly those born before 32 weeks of gestation or with a very low birth weight (less than 1,500 grams) [1]. ROP is considered a leading cause of preventable blindness in children worldwide. Its significance lies in the fact that early detection is crucial to preventing the progression of ROP to more severe stages, making screening of premature infants essential [2]. Primary healthcare centers (PHCS) play a pivotal role in the prevention, early detection, and management of (ROP). Physicians at these centers are integral in implementing strategies that reduce the incidence of ROP and ensure timely intervention for affected infants [3]. In Iraq, several hospital-based studies have documented a significant incidence of ROP among preterm infants; most

available evidence originates from tertiary care centers, leaving significant gaps in understanding the role of primary health care physicians, who are crucial for post-discharge monitoring, growth assessment, and timely referral of at-risk infants [4-7]. Indeed, this study aligns with global health priorities, including WHO's Vision 2020 and the Universal Eye Health Global Action Plan, which emphasize integrating eye health into primary care and ensuring timely detection and management of avoidable blindness [8]. Given the increasing burden of ROP in Iraq and the critical role of PHC physicians in the continuum of neonatal care, particularly post-discharge at-risk infants, it is essential to assess their knowledge, attitudes, and practices regarding ROP. Identifying gaps will help shape targeted training programs, early detection, refine referral protocols, and reduce preventable visual disability in premature infants. This study is the first of its kind in Iraq to systematically explore these aspects among physicians in the primary health care setting. By evaluating PHC physicians' preparedness to address ROP, this research aims to contribute to the reduction of preventable childhood visual disability in Iraq. This study aims to assess the knowledge, attitude, and practice about retinopathy of prematurity among physicians in primary health care centers and clarify the effect of demographic factors on physicians' knowledge, attitude, and practice regarding retinopathy of prematurity.

METHODS

Study design and setting

The design was a cross-sectional study conducted on physicians of primary health care centers in Baghdad, with a study duration of one year, from the 1st of January to the 31st of December 2025. The study targeted the target population was physicians at primary health care centers in Baghdad, including both the Al-Karkh and Al-Rusafa sectors.

Sample size calculation

The sample size of the current study was calculated using the following standard equation [9]:

$$X = Z\ \alpha/2\ ^2\ [p(1-p)] / E^2$$

Where X is the sample size needed, Z is the critical value of the normal distribution curve at α/2, assuming a confidence level of 95%, so that α/2 is equal to 5% and the critical value used is Z=1.96. E represents the margin of error, and in the current study it's equal to 0.05 to achieve the best level of precision. As for *p*-value, it stands for the sample proportion. Expected proportion with good knowledge: 50% (for maximum variability).

Sampling technique

A multistage sampling technique was adopted. In the first stage, 6 health sectors from each directorate were selected by simple random sampling technique. In the second stage, four primary health care centers were chosen from each sector by systematic sampling technique (every third center from an ordered list) alphabetically; hence, there were a total of 24 centers from each directorate, for a total of 48 PHCS. Finally, all eligible physicians in each selected center were invited to participate in the study. About three to seven physicians in each PHCS participated; the total number of participants was 286 physicians enrolled in the study. Structured, self-administered survey questionnaire was used. It was modified based on the expert suggestions. Reliability was assessed (Cronbach's Alpha 0.70) using a pilot sample of 20 participants to determine whether there were any unclear questions [9-11]. This tool contains four sections. Section 1: Demographic data included 6 questions about the physician's age, gender, academic level, medical specialty (including family medicine practitioner, family medicine specialty, and other types of practitioners), and years in practice. Participating in educational activity (conferences, lectures, workshops, and meetings) on children's eye conditions. Section 2: The knowledge domain consisted of 12 multiple-choice items covering the definition, risk factors, screening, management, and prognosis of ROP. One item asking about the source of knowledge was excluded from scoring. Each correct response received a score of 1, whereas incorrect, missing, or "I do not know" answers received 0. The total knowledge score ranged from 0 to 11. Scores were converted to percentages using:

$$Total\ Score\ (\%) = \frac{Individual\ Score\ (0-11)}{Maximum\ \ Score\ (11)} \times 100$$

Based on Bloom's cut-off points, knowledge was categorized as good (>80%), fair (60–80%), or poor (<60%). Section 3: The attitude included 9 Likert-scale statements (agree, neutral, disagree); responses were scored as 2, 1, and 0, respectively; and four reverse-coded items (3rd, 4th, 7th, and 9th) were scored inversely to control for response bias. The total attitude score ranged from 0 to 18 and was converted to percentage form:

$$Total\ Score\ (\%) = \frac{Individual\ Score\ (0-18)}{Maximum\ \ Score\ (18)} \times 100$$

Attitude levels were categorized according to Bloom's criteria as Positive (>80%), neutral (60–80%), or negative (<60%). Section 4: The practice included 8 items assessing screening, counseling, and referral behaviors (Always, Sometimes, Never), scored 2, 1, and 0, respectively. Five items (2nd, 3rd, 4th, 5th, and 8th) were reverse-coded. The total practice score ranged from 0 to 16, converted to a percentage:

$$Total\ Score\ (\%) = \frac{Individual\ Score\ (0-16)}{Maximum\ \ Score\ (16)} \times 100$$

Practice levels were classified as good (>80%), fair (60–80%), or poor (<60%). Reverse-coded questions were intentionally incorporated in the attitude and practice sections to minimize acquiescence bias, enhance

construct validity, and detect inattentive or patterned responses.

Ethical considerations

The Scientific Committee of the Iraqi Board of Family Medicine officially approved the study protocol. An official letter of permission was directed to both the Al-Rusafa health directorate and the Al-Karkh health directorate to facilitate the researcher's efforts to perform this study. Verbal consent was obtained from the physician about filling out the questionnaire.

Statistical analysis

The data were entered and analyzed using Statistical Packages of Social Sciences (SPSS ver. 26). The data is presented by frequencies and percentages, both in tables and graphs. The associations between the general characteristics of the participants and their knowledge, attitudes, and practices levels were tested either by Pearson's chi-square test of independence or the exact test when the latter was not valid (more than 20% of the cells in cross tabs for more than 2 by 2 tables with an expected value less than 5). The confidence level used to confirm the level of significance was 95%. A p-value of ≤0.05 was considered indicative of statistical significance.

RESULTS

Out of the 286 respondents, nearly half (43.0%, n= 123) demonstrated a fair level of knowledge. A considerable proportion of participants (36.0%, n= 103) reported a poor level of knowledge. Encouragingly, only about one-fifth (21.0%, n= 60) exhibited a good level of knowledge, reflecting a solid grasp of the subject and likely readiness to implement best practices in clinical settings (Figure 1).

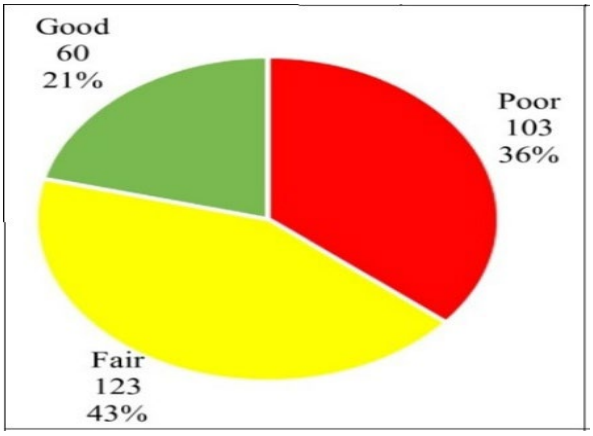

Figure 1: Knowledge level of the physicians surveyed about retinopathy of prematurity (n=286).

Regarding the association between physicians' knowledge and several demographic and related factors. Age groups were not statistically significant (p= 0.366), meaning they did not influence knowledge levels. Similarly, gender showed no significant association, although male participants tended to have slightly higher proportions of poor knowledge (42.3% vs. 34.6% in females, p= 0.251). Academic level emerged as a significant factor (p= 0.003); participants holding only a bachelor's degree had a higher prevalence of poor knowledge (46.2%) compared with those possessing higher academic qualifications (31.3%), while fair knowledge was more frequent among the latter group (49.7%). Medical specialty also significantly influenced knowledge levels (p= 0.003), family medicine practitioners had 43.2% poor knowledge, whereas specialists in family medicine had better distributions, with more participants in the fair and good knowledge categories; practitioners of other specialties had the highest proportion of poor knowledge (70.6%). Practice duration and participation in educational activities on children's eye conditions did not show significant associations with knowledge (p> 0.05); knowledge levels were relatively similar across all experience groups and regardless of educational activity participation (Table 1).

Table 1: Associations of the knowledge level of the study sample about ROP with their general characteristics

Variables		Knowledge levels			
		Poor	Fair	Good	*p*-value
Age groups (year)	<30	9(36)	12(48)	4(16)	
	30-45	78(38)	88(42.9)	39(19)	0.366
	>45	16(28.6)	23(41.1)	17(30.4)	
Sex	Male	22(42.3)	17(32.7)	13(25)	0.251
	Female	81 (34.6)	106(45.3)	47(20.1)	
Academic level	Bachelor	42(46.2)	26(28.6)	23 (25.3)	0.003
	Highest academic level	61(31.3)	97(49.7)	37(19)	
Medical specialty	Family medicine practitioner	32(43.2)	27(36.5)	15(20.3)	
	Family medicine specialty	59(30.3)	95(48.7)	41(21)	0.003
	Another type of practitioner	12(70.6)	1.0(5.9)	4(23.5)	
Practice duration (year)	<5	43(38.1)	51(45.1)	19(16.8)	
	5-10	31(34.8)	40(44.9)	18(20.2)	0.48
	>10	29(34.5)	32(38.1)	23(27.4)	
Participating in educational activity on children's eye conditions.	Yes	25(31.6)	36(45.6)	18(22.8)	0.633
	No	78(37.7)	87(42)	42(20.3)	

Values are presented as frequency and percentage. Significance at <0.05 level by Pearson's Chi-square.

In the present study, the assessment of doctors' attitudes toward ROP revealed a clear variation in the distribution of opinion. Out of the total 286 surveyed physicians, only a small fraction—11 respondents (3.8%)—expressed a distinctly positive attitude toward the condition, indicating a relatively limited group who demonstrated strong support for proactive measures or expressed confidence in managing ROP. The majority of participants, 207 doctors (72.4%), reported a neutral stance, suggesting either uncertainty, insufficient exposure to the topic, or a balanced view without strong inclination toward either supportive or dismissive perspectives. Meanwhile, 68 respondents (23.8%) conveyed a negative attitude, reflecting a considerable proportion of doctors who may perceive ROP-related interventions or screening programs less favorably (Figure 2).

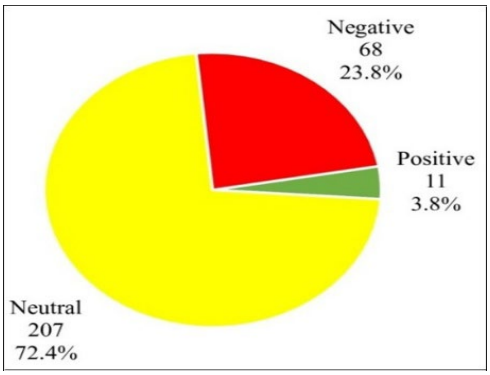

Figure 2: Attitude of the physicians surveyed about retinopathy of prematurity (n=286).

Overall, most participants exhibited a neutral attitude, while smaller proportions expressed positive or negative attitudes. Age was significantly associated with attitude levels (p= 0.004). Participants under 30 years predominantly held neutral attitudes, with fewer displaying positive or negative attitudes. In the 30–45-year group, neutral attitudes were even more common, whereas positive attitudes remained modest. Interestingly, participants over 45 years demonstrated a higher proportion of positive attitudes alongside a lower neutral response, suggesting that older practitioners may be more favorably inclined toward ROP-related issues. Gender did not significantly influence attitudes, as both male and female participants exhibited largely neutral responses with comparable proportions of positive and negative attitudes (p= 0.839). Similarly, academic level showed no significant association (p= 0.125), with slightly higher negative attitudes observed among bachelor's degree holders and modestly higher positive attitudes compared to those with advanced academic qualifications. Medical specialty, however, was significantly associated with attitude levels (p= 0.015); family medicine practitioners were largely neutral with moderate positive attitudes, whereas non-family medicine practitioners showed the highest proportions of both positive and negative attitudes, indicating a more polarized perspective toward ROP. Practice duration and participation in educational activities related to children's eye conditions were not significantly associated with attitude levels (p= 0.664 and 0.282, respectively) (Table 2).

Table 2: Associations of the attitude level of the study sample about ROP with their general characteristics

Variables		Attitude levels			p-value
		Negative	Neutral	Positive	
Age groups (year)	<30	3(12)	17(68)	5(20)	
	30-45	6(2.9)	159(77.6)	40(19.5)	0.004
	>45	2(3.6)	31(55.4)	23(41.1)	
Sex	Male	2(3.8)	36(69.2)	14(26.9)	0.839
	Female	9(3.8)	171(73.1)	54(23.1)	
Academic level	Bachelor	6(6.6)	60(65.9)	25(27.5)	0.125
	Highest academic level	5(2.6)	147(75.4)	43(22.1)	
Medical specialty	Family medicine practitioner	3(4.1)	51(68.9)	20(27)	
	Family medicine specialty	5(2.6)	148(75.9)	42(21.5)	0.015*,[b]
	Another type of practitioner	3(17.6)	8(47.1)	6(35.3)	
Practice duration (year)	<5	3(2.7)	82(72.6)	28 (24.8)	
	5-10	4(4.5)	68(76.4)	17(19.1)	0.664[b]
	>10	4(4.8)	57(67.9)	23(27.4)	
Participating in educational activity on children's eye conditions.	Yes	5(6.3)	53(67.1)	21(26.6)	0.282
	No	6(2.9)	154(74.4)	47(22.7)	

Values are presented as frequency and percentage. *Significance at <0.05 level, [b] Exact test used as Pearson's Chi-square is not valid.

According to levels of practice, among the 286 participants, the majority—222 doctors, representing 77.6%—demonstrated a fair level of practice. A smaller group of 41 doctors (14.3%) exhibited good practice, indicating a subset of practitioners who actively adhere to recommended protocols and demonstrate confidence in ROP management. Conversely, 23 doctors (8.1%) were categorized under poor practice. Most participants demonstrated fair practice, with smaller proportions showing poor or good practice (Figure 3).

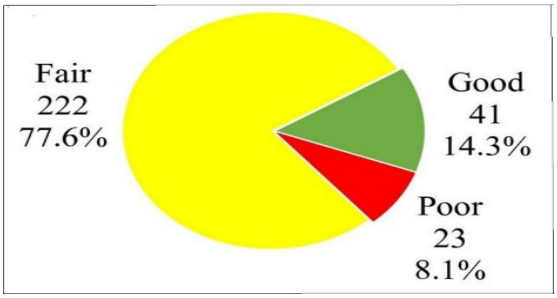

Figure 3: Practice of the surveyed physicians about retinopathy of prematurity (n=286).

Age was significantly associated with practice levels (p= 0.001). Participants aged 30–45 years largely demonstrated fair practice (82%), while younger (<30 years) and older (>45 years) participants showed more variability, with higher proportions of poor and good practice. Participation in educational activities on children's eye conditions also had a significant positive impact (p= 0.007); those who attended such activities exhibited no poor practice, and a higher percentage achieved good practice compared with non-participants. Gender, academic level, medical specialty, and practice duration were not significantly associated with practice levels, although fair practice predominated across all subgroups (Table 3).

Table 3: Associations of the practice level of the study sample about ROP with their general characteristics

Variables		Practice levels			p-value
		Poor	Fair	Good	
Age groups (year)	<30	7(28)	13(52)	5(20)	0.001*,[b]
	30-45	13(6.3)	168(82)	24(11.7)	
	>45	3(5.4)	41(73.2)	12(21.4)	
Sex	Male	6(11.5)	36(69.2)	10(19.2)	0.272
	Female	17(7.3)	186(79.5)	31(13.2)	
Academic level	Bachelor	9(9.9)	71(78)	11(12.1)	0.595
	Highest academic level	14 (7.2)	151(77.4)	30(15.4)	
Medical specialty	Family medicine practitioner	3(4.1)	61(82.4)	10(13.5)	0.1117[b]
	Family medicine specialty	16(8.2)	150(76.9)	29(14.9)	
	Another type of practitioner	4(23.5)	11(64.7)	2(11.8)	
Practice duration (year)	<5	13(11.5)	81(71.7)	19(16.8)	0.26
	5-10	4(4.5)	75(84.3)	10(11.2)	
	>10	6(7.1)	66(78.6)	12(14.3)	
Participating in educational activity on children's eye conditions.	Yes	0(0.0)	65(82.3)	14(17.7)	0.007*
	No	23(11.1)	157(75.8)	27 (13)	

Values are presented as frequency and percentage. *Significance at <0.05 level, [b] Exact test used as Pearson's Chi-square is not valid.

DISCUSSION

This study showed that out of the 286 respondents in selected PHC centers, 43.0% (n = 123) and poor knowledge and 36.0% (n = 103) have poor knowledge, suggesting a partial understanding of the condition with potential gaps that could affect early detection and management. This indicates substantial limitations in their awareness or familiarity with ROP-related risk factors, screening guidelines, and treatment protocols. In addition, about two-thirds of them (77.6%, n=222) demonstrated a fair level of practice, and a smaller percentage of them exhibited a good attitude (3.8%, n=11). This study aligns with global health priorities, including WHO's Vision 2020 and the Universal Eye Health Global Action Plan, which emphasize integrating eye health into primary care and ensuring timely detection and management of avoidable blindness. By evaluating PHC physicians' preparedness to address ROP, this research aims to contribute to the reduction of preventable childhood visual disability in Iraq. Our results showed that 36% of the participants had poor knowledge, whereas 21% had good knowledge. These findings go with a survey carried out (2016-2017) in the West Bank, Palestine, which showed only 22.9% of the included physicians had good knowledge about ROP [12]. While the study of Hadlak *et al*. indicated that half of the surveyed physicians had poor knowledge [14]. Also, Yilmaz et al. conducted a cross-sectional study for assessing physician awareness about eye disorders in general and revealed that 189 out of 262 responders (72.4%) had poor knowledge [10]. Hersi and colleagues reported that 61.5% of family physicians and pediatricians had low knowledge levels about children's eye disorders, similar to the current study's suggestion of limited formal education in this area [13]. In our study, the results showed that academic levels emerged as a significant factor. Participants holding only a bachelor's degree had a higher prevalence of poor knowledge compared with those possessing higher academic qualifications. Medical specialty also significantly influenced knowledge levels. Practitioners in specialties other than family medicine had the highest proportion of poor knowledge. While other sociodemographic features did not affect the knowledge level about ROP, even years of experience did. None of the demographic, academic, and medical specialties affect the knowledge of the physician in the study from Türkiye [10]. On the other hand, the knowledge level of the physicians who participated in the study from Saudi Arabia was directly associated with their experience [13]. The academic level has a tremendous effect on the knowledge level of the physicians in studies from the Jeddah and Al-Qassim regions of Saudi Arabia, where the specialists and consultants had the best levels of knowledge compared to the residents [14,15]. The present study found that only 3.8% of the physicians surveyed had a positive attitude towards retinopathy of prematurity (ROP). The majority reported a neutral stance, while 23.8% had a negative attitude, suggesting a lack of support for ROP-related interventions or screening programs. While a study from Kenya reported that 75% of the healthcare workers at Kilifi Hospital had positive attitudes towards ROP, while 25% had negative attitudes [16]. This thesis emphasized that awareness and training exposure significantly influence attitudes towards neonatal eye disease (ROP). Positive attitudes stemmed from targeted sensitization programs' emphasis on ROP. The current study revealed neutral attitudes towards retinal disease, with age being a

significant factor. Older practitioners had more positive attitudes, while medical specialty significantly influenced attitudes, with family medicine practitioners and specialists showing more neutralized perspectives. These findings are in concordance with the results of a study from Palestine, as older specialists had fewer negative attitudes than nurses and other practitioners [17]. A recently published study from South Africa pointed out that older age was associated with higher odds of having a positive attitude [18]; this may be explained by the fact that older practitioners are more likely to have engaged in continuing medical education, workshops, and professional networking. In addition, professional maturity and a patient-centered perspective may contribute to attitudinal differences. Most participants in this study exhibited fair practice, while few of them exhibited good practice and confidence in ROP management, while 8.1% were poor practice. This was in concordance with the finding of Abutrabi *et al*. study from Palestine [17]. This study reveals age and continuing education significantly influence practitioners' competence in retinal disease management, with fair practice among 30-45-year-olds. Educational activities positively affect practices of the doctors regarding children's eye conditions, while gender, academic level, and practice duration don't. This suggests that simply spending more years in the profession does not guarantee better clinical performance. Instead, engagement in relevant training and educational activities appears to be more important for maintaining high-quality practice, with limited chances for these programs at the primary healthcare level, which has also been reported by Hersi *et al*. [13] and Alzuhairy *et al*. [11] from Saudi Arabia, as they stated that exposure to eye care training is the key point for good practice of the physicians, rather than their experience.

Conclusions

Most of the physicians have fair and poor knowledge; a smaller percentage of them exhibited a positive attitude, and about two-thirds of them demonstrated a fair level of practice. Different factors significantly related to KAP of physicians are age, medical specialty, academic level, and participation in educational activities regarding ROP.

Conflict of interests

The authors declared no conflict of interest.

Funding source

The authors did not receive any source of funds.

Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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