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Knowledge of primary care physicians regarding eye trauma among children under age 14 attending PHC, Riyadh, Saudi Arabia.

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Abstract

Background: Pediatric ocular trauma is common, and can affect their development. Primary care physicians should be knowledgeable about eye trauma, able to recognize eye conditions that can lead to visual loss, thus requiring urgent referral to the ophthalmologist. Therefore, the current study aimed to assess primary care physician's knowledge regarding eye trauma among children in Saudi Arabia.

Methods: A cross-sectional survey has been conducted among primary health care physicians in a primary healthcare center in Riyadh, Saudi Arabia. Data was collected using a questionnaire that was developed and validated by the study authors. The questionnaire was then sent to the targeted physicians through WhatsApp and email.

Results: A total of 200 family physician participated, 51% of them were females. The mean (\pm SD) of the overall knowledge score was 15.03(\pm 4.39) out of 22. The highest percentage (44%) of the respondents showed a good knowledge level (scored 50-75% correct answers), followed by 40% have excellent knowledge level (scored >75%), and 14.50% have poor knowledge level (score <50%). The knowledge score differed significantly ($P < 0.001$) by age being higher among physicians aged ≥ 35 years compared to those aged <35 years at 17.50(\pm 4.74) vs 14.56(\pm 4.17), respectively. Also, the knowledge score was significantly the highest among physicians with experience of 5-10 years, those who dealt with a child with eye trauma with the 12 months prior study conduction, and those who experienced difficulties in dealing with a child patient with eye trauma at 16.68(\pm 4.15), 16.78(\pm 3.80), and 16.03(\pm 4.23), respectively, with a P-value <0.001 in all cases.

Conclusion: Primary care physicians working at PSMMC primary care centers, Riyadh, Saudi Arabia, showed a good knowledge about eye trauma among children aged <14. The knowledge level significantly associated with physicians age, experience, history of dealing with a child with eye trauma, and difficult eye trauma cases.

Keywords: Prevalence, knowledge, ocular trauma, pediatric, primary care physicians

Introduction

Ocular trauma in pediatrics is common and can profoundly affect a child's development and adult life. Globally, a quarter of a million children need hospitalization because of a serious ocular injury every year ^[1]. Eye trauma accounts for 7% of all bodily injuries and 10%-15% of all eye diseases ^[2].

Ocular trauma has significant long-term morbidity in both children and adults ^[3]. For children, visual impairment has a disproportionately greater impact on the quality of life than sight loss in older age ^[4]. Additionally, Eye trauma has an immense impact on individuals, their families, and the community ^[5]. Individuals affected by ocular trauma frequently are distressed with a lack of career possibilities, lifestyle change, and often permanent physical problems ^[6]. Ocular trauma in the pediatric population is of particular concern as injured pediatric eyes are prone to amblyopia ^[7, 8].

For an injured child, taking the history is often poor and a detailed assessment can be challenging. Presenting clinical features in pediatric ocular trauma is limited; nevertheless, injuries are characterized by anterior segment pathology: corneal/scleral laceration, iris prolapse, as well as lens abnormalities ^[9]. A great variation in the management of pediatric ocular trauma was addressed in the literature. With rates of surgical management ranging from 7.4% to 59% depending on the injury mechanism and presenting features ^[10, 12].

It was pointed in the literature that children are pre-disposed to eye injury due to their developing coordination, daring play manner of play, and lack anatomical protection from

the eyebrow, cheekbone, and nose [13].

Other factors including limited common sense, lack of emotional control, relative ignorance, imitation of behavior, and natural curiosity [14, 15]. Countries vary in terms of the characteristics of children at risk, the injury agents, and the environmental determinants of ocular trauma. However, Male gender is one common factor in most injuries [16, 18].

Primary care physicians should be able to recognize eye conditions that can lead to visual loss, thus requiring urgent referral to the ophthalmologist [19]. A thorough history and physical examination are core elements in making a diagnosis and determining the urgency. However, there is a paucity of data available to accurately assess the primary care physicians' knowledge regarding eye trauma among children. Therefore, This study aimed to address this topic to improve patients care.

Literature review

A literature search was conducted, from 2019-2020, using the PubMed and google scholar search engines to look for any similar international or local studies that were conducted to assess the physician knowledge regarding eye trauma in children. Unfortunately, there were no similar studies done in Saudi Arabia or the Gulf Cooperation Council (GCC) countries about the knowledge of primary care physicians regarding eye trauma in children.

Public awareness about common eye disease was found to be sufficient but they were less aware about specific eye conditions as was shown in previous study in Saudi Arabia [20].

Pediatric acute ocular injuries continue to be prevalent [21]. In multiple studies in France, Brazil and USA showed that the most common sitting for eye injury was at home [22, 25], on the other hand just one study that most common place for eye injury was outside environment [26].

Studies from India and France showed that Ocular trauma in children remains an important preventable cause of ocular morbidity [27, 28].

In Qatar, USA and Egypt the Eye injury prevailed in school age male children [29, 32].

Eye trauma in children has a high morbidity, multiple studies showed that Visual impairment and blindness are the most common complications from ocular trauma in children [33, 36].

Methods

This was a cross-sectional survey study that has been conducted among primary health care physicians in a primary healthcare center in Riyadh, Saudi Arabia. The data collection tool was a questionnaire that has been developed based on a literature review of previous similar studies. The questionnaire consists of three sections, the first is the sociodemographic section and includes age, gender, nationality, postgraduate education, and experience. The second section addressed questions regarding experience with eye trauma, and the third section was about knowledge regarding eye trauma.

The developed questionnaire was then validated through a pilot study on 10 PHC physicians who answered it within few minutes without facing any problems. The questionnaire was then sent to the targeted physicians through WhatsApp and email. The aim and objective of the study were explained at the beginning of the questionnaire, and it was mentioned that participation is completely

voluntary, and the collected data will be kept confidential, anonymously, and will be used for research purposes only.

Statistical analysis

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Continuous variables were expressed as mean \pm standard deviation and categorical variables were expressed as percentages. The t-test and one way ANOVA were used for continuous variables. Cronbach's alpha was used to assess the reliability and internal consistency of the items in the questionnaire. Univariate and multivariate logistic regression was used to assess the associated factors with a low level of awareness. A p-value <0.05 was considered statistically significant.

Results

The Cronbach's alpha value of the questionnaires was scored at 0.827 which reflects good reliability and internal consistency of the questionnaire.

The sociodemographic data and experience of the primary care physicians are shown in table (1). The total number was 200, female gender represented 51%, and 84% were aged <35 years as shown in table (2). All (100%) of the participants received postgraduate education, and the highest percentage (62%) have experience of <5 years. More than half (54%) of the respondents have ever dealt with eye trauma in the last 12 months before study conduction. More than 60% of the physicians reported experiencing difficulties in dealing with child patients with eye trauma.

The percentages of correct answers to the knowledge questions are shown in table (3), and figure (1). The percentage of correct answers ranged from 36.5% for the point "Visual Acuities of 6/6 exclude serious problems, including penetrating injury", being the lowest to 93% for the point " If you suspect deep laceration, immediate attention and urgent referral to an ophthalmologist is needed", being the highest. Less than half (42%) of the primary care physicians participated in the current study knew that it is advisable to restrain a child during an eye exam, only (42.5%) knew that if they suspect an open globe injury, Seidel's test should be done first before assessing corneal abrasion with dilute fluorescein, and 48% know that the younger the patient the higher the risk for amblyopia after eye trauma. All the remaining knowledge questions were correctly answered by more than half of the physicians.

The mean of the total score for knowledge of primary care physicians by their characteristics is shown in table (4). The mean (\pm SD) of the overall knowledge score in the current study was 15.03(\pm 4.39) out of 22, indicating a good knowledge level. Such mean score was non statistically significantly higher among females at 15.44(\pm 3.95) compared to 14.60(\pm 4.79), with a P-value of 0.117. In contrast, the knowledge score differed significantly ($P <0.001$) by age being higher among physicians aged ≥ 35 years compared to those aged <35 years at 17.50(\pm 4.74) vs 14.56(\pm 4.17), respectively. Also, the knowledge score was significantly the highest among physicians with experience of 5-10 years, those who dealt with a child with eye trauma with the 12 months prior study conduction, and those who experienced difficulties in dealing with a child patient with

eye trauma at 16.68(±4.15), 16.78(±3.80), and 16.03(±4.23), respectively.

The level of knowledge of primary care physicians regarding eye trauma is shown in table (5), and figure (2). The highest percentage (44%) of the respondents showed a good knowledge level (scored 50-75% correct answers), followed by 40% have excellent knowledge level (scored >75%), and 14.50% have poor knowledge level (score <50%).

Participants with an acceptable (scored ≥50%) knowledge level (represented 85.5% of the whole sample) were compared according to their demographic characteristics and the results are shown in table (6).

The univariate logistic regression showed that age <35

years, never dealing with a child with eye trauma in the past 12 months, and the absence of experiencing any difficulties in dealing with child patients with eye trauma were the factors that showed a significant association with a low level of knowledge. Where the risk of low knowledge was almost four times higher in those aged <35 (OR= 3.96), more than six times (OR= 6.66) higher in those who did not deal with a child with eye trauma, and more than two times (OR= 2.70) higher among those who did not experience difficulties, as shown in table (7). These factors remain significantly correlated with a low level of knowledge even after multivariate logistic regression, with OR of 2.58, 5.37, and 2.45, respectively, as shown in table (8).

Table 1: Reliability for the items of the questionnaire.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. Most of eye trauma in young children occurs at home:	32.655	60.951	0.258	0.826
2. 90% of eye injuries in sports can be prevented if the child wears protective eyewear:	32.375	58.145	0.418	0.819
3. Unilateral blindness is the most serious complication from eye trauma in children:	32.415	58.626	0.374	0.821
4. It is advisable to restrain child during eye exam:	32.235	59.859	0.330	0.823
5. The younger the patient the higher the risk for amblyopia after eye trauma:	32.095	59.875	0.256	0.828
6. Suspect child abuse in all cases of paediatric eye trauma especially if the history doesn't match with clinical picture:	32.800	59.960	0.438	0.819
7. Visual Acutities of 6/6 exclude serious problems, including penetrating injury.	32.210	59.262	0.411	0.820
8. Progressive Reduction in visual acuity is a serious red flag sign that indicate immediate referral	32.865	61.072	0.372	0.822
9. If you suspect open globe injury, you should immediate refer the patient to the ophthalmologist:	32.945	60.846	0.486	0.819
10. In case of open globe injury, the injured eye should be covered with eye shield:	32.510	58.663	0.421	0.819
11. Examination under anaesthesia is warranted if open globe injury can't be ruled out:	32.170	56.604	0.484	0.816
12. In chemical eye injuries, Alkali burns are generally more severe and cause penetrating eye injuries, than acid injuries	32.285	60.617	0.219	0.830
13. Common causes of alkali eye injury are: fertilisers, refrigerants, plaster, cement and whitewash	32.270	58.701	0.345	0.823
14. Common causes of acid eye injury are: car batteries, bleach, vinegar and glass polishing	32.510	59.980	0.296	0.825
15. In chemical eye injuries, urgent irrigation before pausing for history or examination is mandatory	32.935	60.674	0.478	0.819
16. In chemical eye injury, Copious irrigation using isotonic saline or lactate ringer solution for at least for 15 minutes, is crucial	32.725	59.085	0.451	0.818
17. PH test used in cases of chemical eye injury after irrigation:	32.355	57.265	0.471	0.816
18. Cornea lacerations may be small and can be missed	32.885	60.665	0.421	0.820
19. If you suspect an open globe injury, Seidel's test should be done first before assessing corneal abrasion with dilute fluorescein	32.000	57.065	0.460	0.817
20. If you suspect deep laceration, immediate attention and urgent referral to ophthalmologist is needed:	32.950	61.264	0.432	0.821
21. In case of superficial laceration, antibiotics should be given to prevent infection:	32.670	58.815	0.480	0.817
22. If you suspect foreign body injury you should remove it gently if it is small superficial not penetrating the cornea:	32.715	58.848	0.506	0.816

Table 2: Characteristics of the participants

		Number	%
Gender	Male	98	49.0
	Female	102	51.0
Age (Mean ± SD)	30.54	4.86	
	age <35y	168	84.0
Nationality	age ≥35y	32	16.0
	Saudi	197	98.5
Did you receive postgraduate education or certificate?	Non Saudi	3	1.5
	Yes	200	100.0
Work experience in medical field:	Less than 5 years	124	62.0
	5-10 years	66	33.0
	More than 10 years	10	5.0
Did you ever deal with child with eye trauma before in the past 12 months?	Yes	108	54.0
	No	92	46.0
If yes, how many cases (Mean ± SD)		2.23	1.86
Are you experiencing any difficulties in dealing with child patient with eye trauma?	Yes	125	62.5
	No	75	37.5
If yes, which part is the most difficult?	Diagnosis	10	5.0
	Diagnosis; Management	10	5.0
	Diagnosis; Management; Referral	7	3.5

	Diagnosis; Referral	2	1.0
	Eye examination	1	.5
	Lack of instruments	1	.5
	Management	40	20.0
	Management; Extent of injury	1	.5
	Management; Referral	14	7.0
	Referral	39	19.5

Table 3: Percentages of correct answers of the questionnaire

Item	Number	%
1. Most of eye trauma in young children occurs at home:	151	75.5
2. 90% of eye injuries in sports can be prevented if the child wears protective eyewear:	119	59.5
3. Unilateral blindness is the most serious complication from eye trauma in children:	128	64.0
4. It is advisable to restrain child during eye exam:	84	42.0
5. The younger the patient the higher the risk for amblyopia after eye trauma:	96	48.0
6. Suspect child abuse in all cases of paediatric eye trauma especially if the history doesn't match with clinical picture:	165	82.5
7. Visual Acuities of 6/6 does not exclude serious problems, including penetrating injury.	73	36.5
8. Progressive Reduction in visual acuity is a serious red flag sign that indicate immediate referral	173	86.5
9. If you suspect open globe injury, you should immediate refer the patient to the ophthalmologist:	185	92.5
10. In case of open globe injury, the injured eye should be covered with eye shield:	130	65.0
11. Examination under anaesthesia is warranted if open globe injury can't be ruled out:	105	52.5
12. In chemical eye injuries, Alkali burns are generally more severe and cause penetrating eye injuries, than acid injuries	112	56.0
13. Common causes of alkali eye injury are: fertilizers, refrigerants, plaster, cement and whitewash	114	57.0
14. Common causes of acid eye injury are: car batteries, bleach, vinegar and glass polishing	136	68.0
15. In chemical eye injuries, urgent irrigation before pausing for history or examination is mandatory	185	92.5
16. In chemical eye injury, Copious irrigation using isotonic saline or lactate ringer solution for at least for 15 minutes, is crucial	160	80.0
17. PH test used in cases of chemical eye injury after irrigation:	120	60.0
18. Cornea lacerations may be small and can be missed	178	89.0
19. If you suspect an open globe injury, Seidel's test should be done first before assessing corneal abrasion with dilute fluorescein	85	42.5
20. If you suspect deep laceration, immediate attention and urgent referral to ophthalmologist is needed:	186	93.0
21. In case of superficial laceration, antibiotics should be given to prevent infection:	147	73.5
22. If you suspect foreign body injury you should remove it gently if it is small superficial not penetrating the cornea:	152	76.0

Table 4: Mean of total score for Knowledge of primary care physicians by their Characteristics

		Mean	SD	P value
Overall		15.03	4.39	
Gender	Male	14.60	4.79	0.117
	Female	15.44	3.95	
Age	age <35y	14.56	4.17	<0.001*
	age ≥35y	17.50	4.74	
Nationality	Saudi	15.00	4.41	0.220
	Non Saudi	17.00	2.00	
Work experience in medical field:	Less than 5 years	14.13	4.32	0.001*
	5-10 years	16.68	4.15	
	More than 10 years	15.30	4.03	
Did you ever deal with child with eye trauma before in the past 12 months?	Yes	16.78	3.80	<0.001*
	No	12.98	4.16	
Are you experiencing any difficulties in dealing with child patient with eye trauma?	Yes	16.03	4.23	<0.001*
	No	13.36	4.17	

* Significant p value

** out of 22 (the score have 22 items every item have one point, correct answer = 1, false answer = 0)

Table 5: Level of Knowledge of primary care physicians regarding eye trauma

	Number	%
Excellent	82	41.00
Good	89	44.50
Poor	29	14.50
Excellent : Score > 75%		
Good : Score between 50 and 75%		
Poor : Score < 50%		

Table 6: Acceptable level of knowledge about the Knowledge of primary care physicians regarding eye trauma

		Participants	Acceptable level of knowledge			
			Number	%	95% CI	
					Lower	Upper
Gender	Male	98	83	84.7	76.6	90.8
	Female	102	88	86.3	78.6	91.9
Age	age <35y	168	146	86.9	81.2	91.4
	age ≥35y	32	25	78.1	61.8	89.6
Nationality	Saudi	197	168	85.3	79.8	89.7
	Non-Saudi	3	3	100	46.4	100
Work experience in medical field:	Less than 5 years	124	106	85.5	78.5	90.8
	5-10 years	66	58	87.9	78.4	94.1
	More than 10 years	10	7	70	39.4	90.7
1. Did you ever deal with child with eye trauma before in the past 12 months?	Yes	108	99	91.7	85.3	95.8
	No	92	72	78.3	69	85.7
3. Are you experiencing any difficulties in dealing with child patient with eye trauma?	Yes	125	115	92	86.3	95.8
	No	75	56	74.7	64	83.4
Total		200	171.0	85.5	80.1	89.9
Score of acceptable level of knowledge ≥ 50						
95% CI: 95% confidence interval						

Table 7: Univariate logistic regression for the associated factors with low level of knowledge

		Odds ratio	95% CI		P value
			Lower	Upper	
Gender	Male	1.673	.947	2.957	0.076
	Female**	1			
Age	age <35y	3.960	1.759	8.914	0.001*
	age ≥35y**	1			
Nationality	Saudi	2.925	.261	32.803	0.384
	Non Saudi**	1			
Work experience in medical field:	Less than 5 years	3.150	.841	11.792	0.088
	5-10 years	1.250	.323	4.845	0.747
	More than 10 years**	1			
Did you ever deal with child with eye trauma before in the past 12 months?	Yes**	1			<0.001*
	No	6.669	3.473	12.805	
Are you experiencing any difficulties in dealing with child patient with eye trauma?	Yes**	1			0.002*
	No	2.706	1.455	5.033	

Table 8: Multivariate logistic regression for the associated factors with low level of knowledge

		Odds ratio	95% CI		P value
			Lower	Upper	
Age	age <35y	2.589	1.056	6.347	0.038*
	age ≥35y**	1			
Did you ever deal with child with eye trauma before in the past 12 months?	Yes**	1			<0.001*
	No	5.378	2.732	10.588	
Are you experiencing any difficulties in dealing with child patient with eye trauma?	Yes**	1			0.010*
	No	2.453	1.236	4.870	

* Significant p value

** Used as a reference

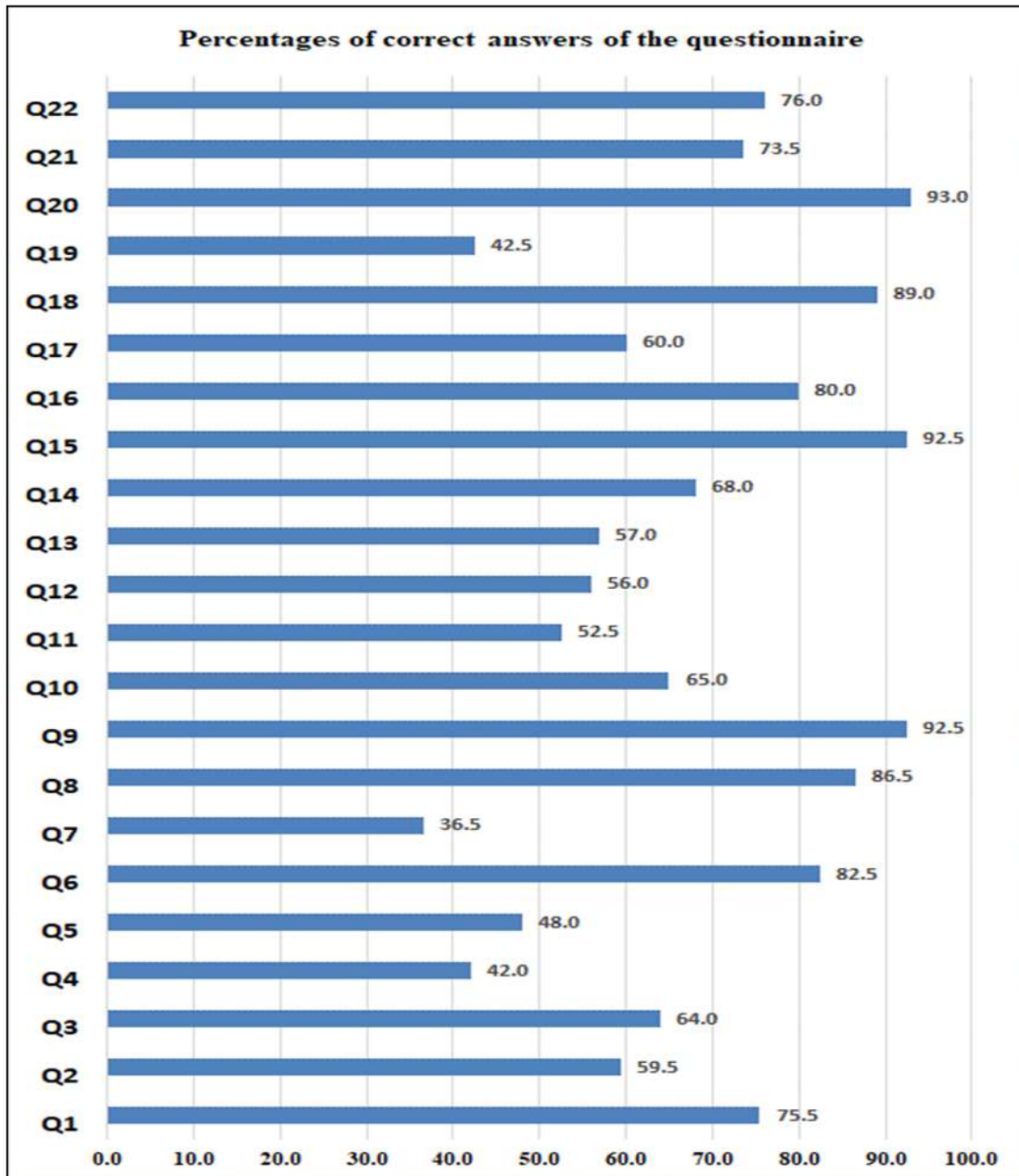


Fig 1: Percentages of correct answers of the questionnaire

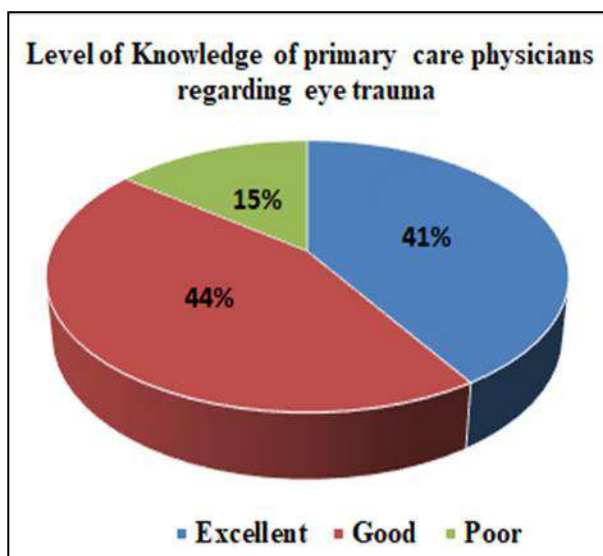


Fig 2: Level of Knowledge of primary care physicians regarding eye trauma

Discussion

Primary health care centers are mostly the first point of access to health care in Saudi Arabia [37] and therefore the closest to the communities particularly in rural areas. Family physicians working at PHC therefore should have the appropriate knowledge and skills to render basic health services including primary eye care. The level of knowledge of those who participated in the current study is considered acceptable.

Our results revealed that participated primary care physicians have a good knowledge level, and the knowledge level was significantly correlated with the age, experience of 5-10 years', history of dealing with a child with eye trauma, and those experienced difficulties in dealing with a child patient with eye trauma. However, The lack of literature on the knowledge of primary care physicians regarding eye trauma among children under age 14 makes comparing our results difficult.

Eye chemical burns represent potentially blinding ocular injuries and constitute a true ocular emergency requiring

immediate assessment and initiation of treatment. Abundant irrigation before ophthalmic evaluation should be performed immediately [38]. Primary care physicians who participated in the current study were highly knowledgeable about this, and also about the urgent referral of deep laceration and the open globe injury cases to an ophthalmologist. In contrast, the participants showed a lower awareness level regarding the importance of restraining a child during eye examination. Physical restraining or sedation is advisable in uncooperative children, particularly in urgent cases or the need for further information [39]. The Seidel test is intended to detect the leak of aqueous fluid following globe penetration. A positive test indicates a leakage of aqueous humor for the anterior chamber, which needs immediate surgical repair, and any further manipulation of the eye is contraindicated [40]. Unfortunately, such important knowledge was missed from more than half of the primary care physicians who participated in the current study which necessitate the need for education and awareness programs in this regard.

Globally, 20%–59% of all ocular trauma occurs in children [41, 42], and this was known by almost three-quarters of our respondents. Most eye injuries in children occur at home (76%), with the remainder occurring during sport and other recreational activities [43]. It was previously reported in the literature that visual acuity of 6/6 doesn't exclude serious eye complications, however only 36.5% of primary care physicians participated in the current study know this point [44, 45].

In general, physicians with more experience are believed to have accumulated knowledge and skills during practicing years and consequently deliver high-quality care. In contrast to that, it was reported in a systematic review [46] that physicians with more years in practice may be less likely to deliver high-quality care due to the frequent medical advances, and the explicit knowledge that physicians have may easily become out of date. From another side, it was found that physicians performance primarily increased with increasing experience, peaked, and then decreased (concave relationship), and this was the scenario in the current study, where primary care physicians with 5-10 years experience showed higher knowledge compared to those with <5 and >10 years experience [46]. Therefore, it could be concluded that in some situations, while "practice makes perfect", physicians' knowledge and performance may decline with time.

In a local study that assessed the public awareness of common eye diseases. It was found that female adults on average had better knowledge regarding eye diseases and eye care, this was in an accordance with our study results, putting into consideration the difference between the two studies population, as in our case they were physicians while the other one was among the general population [47]. Additionally, that study [47] was in line with ours in the point that older participants have a higher knowledge level compared to younger ones.

Overall, the assessed eye trauma knowledge level in the current study is considered lower compared to the trauma providers knowledge assessed for trauma injury care among nurses, physicians, and therapists at 75% [48]. However, this study [48], and another previous study [49], were in line with ours in the points that experience and self-rated competence were independently associated with reported and practice of trauma management. In Tehran, emergency medical

technicians knowledge and attitude regarding emergency trauma was assessed and the results showed that the majority (81.1%) of participants had an average knowledge of trauma, 17.4% had a good level of knowledge regarding trauma, and 88.3% had a positive attitude toward trauma and taking care of trauma patients [50]. These findings are different from ours, since 44% showed a good level, and 40% showed an excellent level of eye trauma knowledge. Such differences in knowledge levels between our study might be due to the different studied populations and the type of trauma assessed.

As with any study, the current study has its limitations including the small sample size, and that the participants were from one area in the Kingdom, thus the results cannot be generalized to the whole primary care physicians in Saudi Arabia. Despite these limitations, this is the first study to address primary care physicians knowledge regarding eye trauma, and the results highlighted the weak points that might need educational programs to improve primary care physicians knowledge in this regard.

Conclusion

Overall, a good knowledge level regarding eye trauma among children aged <14 was reported among primary care physicians working at PSMCM primary care centers, Riyadh, Saudi Arabia. There was a significant positive association between the knowledge level and physicians age, experience, history of dealing with a child with eye trauma, and difficult eye trauma cases. Although a good knowledge level was found among primary care physician, there are points which there was some deficiency and so there is still area for improvement. In order to increase the level of knowledge we suggest educational programs for primary care physician.

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