

Knowledge of Amblyopia among Primary Health Care Physicians and Family Medicine Residents: A Cross-Sectional Study in the Qassim Region of Saudi Arabia

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Abstract

Background: Amblyopia is a serious visual impairment resulting from abnormal visual stimulation during early childhood. Early detection of childhood visual abnormalities will reduce adult visual impairment. This study aimed to assess the knowledge of Amblyopia among primary Health Care (PHC) physicians and Family Medicine Residents (FMA) in Qassim Region.

Methods: A cross-sectional study enrolled 197 PHC physicians and residents from FMA. Data were collected through an online questionnaire with variables on physicians' knowledge about amblyopia based on the Canadian Pediatric Society Recommendations for Vision Screening at Infant and Well Child Visits. The data was analyzed using SPSS version 21.

Results: The respondent's average age was 35 (SD \pm 8.00). Males were 103(52.3%); the majority were Saudi 120 (60.9%). Most of them, 189 (96%) knew the definition of amblyopia. But the majority of physicians, 138 (70%) had not seen or diagnosed any case of amblyopia before. The overall knowledge of the family medicine residents and PHC physicians regarding amblyopia's prevalence rate, causes, examination, and treatment was good at 178 (90.4%). However, their knowledge of referral criteria for amblyopia cases still needed more updating. No statistical relationship was identified between the participant's demographic characteristics and their level of knowledge.

Conclusions: This study highlighted a good knowledge level regarding amblyopia among primary health care physicians and family medicine residents. However, strategies to improve vision screening are necessary. Early intervention is crucial to prevent treatable causes of vision loss in children.

Keywords: Amblyopia; vision screening; Primary health Care; Qassim; Saudi Arabia

Introduction

Amblyopia often called “lazy eye”, is a decrease in visual acuity resulting from abnormal visual development in infancy and early childhood (1). The vision loss ranges from mild (worse than 20/25) to severe (legal blindness, 20/200 or worse) (2). Although generally unilateral, amblyopia may affect both eyes. No apparent cause for the decreased vision can be detected on physical examination: the cornea, lens, retina, and optic disc are normal (3).

Worldwide, amblyopia affects approximately 3 % of the population and leads to a lifetime risk of visual loss of at least 1.2% (4). The prevalence of amblyopia in Saudi Arabia varies by region: 2.6% in Riyadh (5) 3.9% in Qassim province (6) 1.3 % in Jeddah (7) and 1.9 % in Abha (8). Although the prevalence of amblyopia is low still its associated serious complication is vision loss (9,10).

Early recognition of amblyogenic risk factors such as strabismus, refractive errors and anatomic obstructions can facilitate early treatment and increase the chance for recovery of visual acuity (11). Screening programs for detecting visual abnormalities in children and young adults are very important. Yet the school health program in Saudi Arabia has routine vision screening examinations for school-age children. Any child with visual acuity in either eye of 20/40 or worse at age three to five years, or 20/30 or worse at age six years or older, or a two-line difference in acuity between eyes, should be referred to an ophthalmologist for further evaluation and definitive therapy (12).

Amblyopia treatment is started at the time of diagnosis and depends on the etiology. Treatment options for children with strabismus include patching and atropine drops. Children with refractive errors should be prescribed corrective lenses. Corneal lesions, cataracts, and ptosis require surgery. The success of therapy is highly dependent on treatment compliance. Patients and their parents should be educated about the need for regular follow-up and the risk of permanent vision loss (13).

The role of the Family medicine and Primary health care (PHC) physicians is fundamental in the early detection of Amblyopia. They are the cornerstone in public health and preventive medicine. Awareness of Family medicine and PHC physicians about amblyopia and following the visual screening guidelines especially for children will reduce the prevalence of amblyopia and its complications. In this study, we assessed the knowledge and practices of the PHC physicians and Family Medicine Residents towards amblyopia.

Materials and Methods

Study design, setting, and population

This cross-sectional study was carried out between 12th October 2020 to 31st September 2020 in Qassim Region, Saudi Arabia. Qassim is located in the central part of Saudi Arabia with an estimated population of 1.5 million in 2020. About 37 Primary Health Care Centers (PHCCs) were selected from a total of 40 PHCCs founded at the Buraydah health sector in Qassim Region, Saudi Arabia.

Sample Size

This study was conducted among both PHC physicians and Family Medicine Academy Residents. Targeted sample size was 247 PHC physicians and FMA residents. A total of 174 PHC physicians who are working at selected PHCCs at Buraydah health sector at the time of the study were involved. Also, all FMA Residents (73) from R1 to R4 were targeted. The study Respondents were 197 out of 247 including 55 FMA residents and 142 PHC physicians.

Sampling procedure

Convenience sampling was applied for the selection of facilities and participants. 40 PHCCs were approached for participant recruitment as well as the Qassim FMA. After explaining the purpose of the study and getting approval from the administration, participants' contact numbers were obtained from the participating facilities. A total of 197 participants were invited to participate and the link of the questionnaire was sent on their WhatsApp number.

Data collection procedure and instrument

Data was collected online using Google Form. The link of the questionnaire was sent to the participants' mobile numbers. After the initial invitation, a reminder message was sent one week after the first invitation. A semi-structured questionnaire was developed after a review of the literature, especially American and Canadian guidelines for Amblyopia diagnosis and management [14].

The questionnaire contains contained 22 items divided into two sections. Questions in the first section collected information about participants' age, gender, nationality, Last Qualification, place of work, and years of experience and the second section collected information about the participants' knowledge regarding the amblyopic diagnosis, treatment, and perception. A pilot study was done before starting the data collection to assess the accuracy of the survey questions.

Analyses were carried out using SPSS version 21.0. Frequencies and proportions of responses were calculated. The response for assessing the participants' knowledge was shown as good or poor knowledge using statistical analysis for the nineteen knowledge questions. The knowledge questions' answers were scored as follow; score “1” was given to the correct answer, and “0” score was given for those incorrectly answered. Participants with a total knowledge score of 0–9 were categorized as “poor” knowledge and that of 10–20 as “good” knowledge.

Categorical variables were reported as frequency (n), percentage, and continuous variables as mean \pm standard deviation (SD) and range. Significant differences in the frequencies and percentages of categorical variables were analyzed by using the Chi-square test. A P-value of <0.05 was considered statistically significant.

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Qassim Regional Bioethics Committee (Approval#: 1441-1064995). Informed consent was obtained from all subjects involved in the study.

Results

Out of 247 PHC physicians and FMA residents invited, a total of 197 participants responded to this online survey giving a response rate of 79.8%. Characteristics of the study population are summarized in Table 1. A total of 197 physicians responded to the questionnaire. Of them 104 (52%) were male. The mean age of the participants was 35 (SD \pm 8) years, ranging from 22 to 63 years. More than half of the respondents were Saudi 120 (61%). The last qualification of PHC physicians was ranked as follows; Consultants 17 (9%), Specialists 50 (25%), General practitioner (GP) 50 (25%), diploma 14 (7%), and the Residents 66 (34 %). The residents were found to be 16 (24%) from R4, 20 (31%) R3, 12(18%) R2 and 18 (27%) R1. The average experience years for respondents was 9 (SD \pm 7.7) years, ranging from less than one year to 35 years.

Participants' knowledge about amblyopia

In this study, most PHC physicians and family medicine residents 178 (90.4%) had a good level of knowledge regarding amblyopia (Figure 1). The study revealed that most of the participants 189 (96%) knew what amblyopia is, but the majority 138 (70%) had never seen or diagnosed a case of amblyopia during their practices. More than half of the respondents 110 (56%) knew the vision screening guidelines. The majority of the 174 (88%) knew that amblyopia is a treatable condition. Table 2.

Figure 1: Level of Knowledge of the PHC physicians and family medicine residents about Amblyopia, Qassim Region, (n=197).

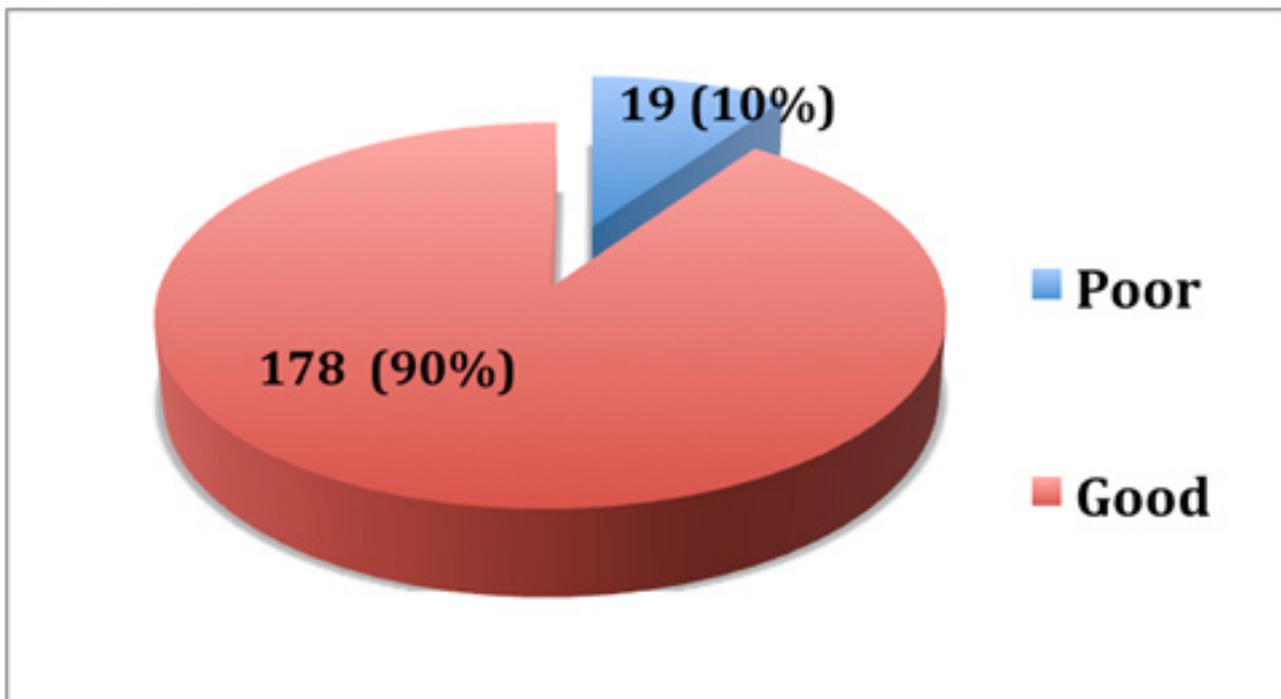


Table 1: Participants' socio-demographic, Qassim Region, (n=179).

Characteristics	Frequency (n)	Percentage (%)
Age group		
25-35 years	117	59.4
36-45 years	56	28.4
46-55 years	17	8.6
>55 years	7	3.6
Gender		
Male	103	52.3
Female	94	47.7
Nationality		
Saudi	120	60.9
Non-Saudi	77	39.1
Last Qualification		
Consultant	17	8.6
Specialist	50	25.4
Diploma	14	7.1
General Practitioner (GP)	50	25.4
Resident	66	33.3
Level of residents		
R1	18	9.1
R2	12	6.1
R3	20	10.2
R4	16	8.1
Years of Experience		
> 1 year	31	15.7
1-5 years	53	26.9
6-10 years	37	18.8
11-20 years	65	33.0
>20 years	11	5.6
Place of Work/ Rotation		
PHCC	162	82.2
Hospital	35	17.8

Table 2: Participants' knowledge about amblyopia, Qassim Region (n=197).

Questions	Yes N (%)	No N (%)
Do you know what Amblyopia is?	189(95.9)	8 (4.1)
Have you diagnosed a case of Amblyopia before?	59(29.9)	138(70.1)
Do you know the vision screening guidelines?	87(44.2)	110(55.8)
Is it a treatable condition?	174(88.3)	23(11.7)

Table 3 shows the physician's responses to the questions designed to assess the knowledge of physicians regarding amblyopia; these questions were derived from the American Academy of Family physicians' guidelines. In this study, the majority of participants 177 (89.8%) knew the correct answer about the definition of amblyopia, which is "a decrease in best-corrected visual acuity resulting from abnormal vision development in infancy and early childhood".

Table 3: Physicians' knowledge regarding amblyopia based on American Academy of Family physicians' guidelines, (n=197).

Questions	Yes N (%)
According to the American Academy of Family physicians, Amblyopia(lazy eye) is one of the following definitions?	
Blindness in early infancy	27(13.7)
Delayed development of the eye	54(27.4)
Presence of refractive error not corrected	94(47.7)
*Decrease in best-corrected visual acuity resulting from abnormal vision development in infancy and early childhood	177(89.8)
Knowledge about the prevalence of Amblyopia n=197	
*2-4%	109(55.3%)
8-10%	74(37%)
15-20%	14(7.1%)
25-30%	0
The Causes of Amblyopia	
*Refractive errors	155(78.7)
*Strabismus/squint	152(77.2)
*Cataract	57(28.9)
Common Presentation of a child with Amblyopia	
Ocular pain	23(11.7)
Tearing	34(17.3)
Nystagmus	68(34.5)
*Usually, asymptomatic	165(83.8)
The best for the diagnosis of Amblyopia	
By red reflex	37(18.8)
*By checking the vision By slit lamp examination	117(59.4)
By fundoscopic examination	26(13.2)
	17(8.6)
What is the kind of modality that is usually used for Amblyopia treatment?	
*Patching the good eye	170(86.3)
Patching the affected eye	21(10.7)
Patching is not effective in treating Amblyopia	21(10.7)
Regarding the time of treatment:	
It cannot be treated after the age of one year	10(5.1)
There is no time limit for treatment, it can be treated anytime	16(8.1)
Treatment at the age of 2 years is the best time for treatment	15(7.6)
*It should be treated as early as possible before the age of 7 years	156(79.2)
*The correct option for each main question	

More than half of the physicians 109 (55.3%) knew the global prevalence rate of amblyopia 2- 4%. However, the knowledge of the physicians regarding the causes of amblyopia was varying; the majority knew refractive errors 155 (78.7%) and strabismus/squint 152 (77.2%) were the causes of amblyopia, but a few of them 57 (28.9%) knew that cataract is one of amblyopia's causes. The physicians were asked about the common presentation of amblyopia in children. Most of the 165 (83.8) correctly answered the question which was "the usual presentation of amblyopia in children is the asymptomatic presentation". Half of the respondents 117(59.4%) knew the best way for amblyopia diagnosis is by checking the vision. Also, the majority of 170 (86.3) knew that patching the good eye is the best kind of modality that is usually used for Amblyopia treatment. Approximately 156 (79.2%) of the participants knew the suitable time for amblyopia treatment, was that it should be treated as early as possible before the age of 7 years.

Participants' knowledge about amblyopia based on the Canadian Pediatric Society Recommendations for Vision Screening at Infant and Well Child Visits.

Table 4 shows the physicians' knowledge based on the Canadian Paediatric Society Recommendations for Vision Screening at Infant and Well Child Visits about amblyopia. It also summarized physicians' knowledge about the different methods used for vision testing. In the eye examination of a 3 months old baby, the commonest method used for eyes' visual inspection is the "red reflex examination". Our study found 125 (63%) physicians correctly knew that red reflex examination was the best method for visual inspection of 3 months old baby. However, some physicians gave a wrong answer for eye examination such as Fixation and following the target 37 (19%), cover-uncover test 29 (14.7%), and Visual acuity testing 6 (3.0%).

Half of the participants 105 (53.3%) knew the best tool for checking the vision of a child aged from 6 to 12 years, is by "Fixation and following a target" compared to the other tools for vision checking such as 44 (22.3%) Slit lamp examination, 35 (17.8%) Fundus examination, and 13(6.6%) E-chart (Snellen chart). (Table 4)

Exactly 123 (62.4%) of the study participants correctly knew that optotypes or E- charts (Snellen chart) are the commonest methods for checking the vision of a 3 to 5-year-old child. But the bulk of physicians knew other different methods which were wrongly used for examination of amblyopia cases such as red reflex, 20 (10.2%), Slit lamp 31(15.7%), and fundoscopic examination 23(11.7%).

In Table 4, the attitude of the respondents was examined by giving them a case scenario of a child aged 6 to 8 years for vision screening, and the participants were asked what do you prefer to do? About 76 (38.6%) of them preferred to examine whenever complaints occur, 36(18.3%) will do the red reflex test, 57(28.9%) will refer to the ophthalmologist, and 28(14.2%) will do only history and patient reassurance. The majority 177 (89.8%) of physicians knew correctly the referral criteria for a case of 3 months old baby. Table 4.

According to the Canadian Pediatric Society Recommendations, the referral conditions of an infant aged 6 to 12 months to an ophthalmologist are; "Infant with chronic tearing and discharge, Infant with nystagmus, and Infant with strabismus" In this study, we found most of the physicians 168 (85.3%), knew these referral criteria for such a case. Table 4

Table 4: Assessment of Physicians' Knowledge based on the Canadian Pediatric Society Recommendations for Vision Screening at Infant and Well Child Visits. (N=197).

Questions	Yes N (%)
In case you have a newborn to 3 months baby –which of the following can be done to examine the eye? *Red reflex examination Visual acuity testing Cover-uncover test Fixation and following the target	 125(63.5) 6(3.0) 29(14.7) 37(18.8)
In case you have a baby of 6 months to 12 months of age– what tool from the following is the best to check the vision? Fundus examination Slit lamp examination E-chart (Snellen chart) *Fixation and following a target	 35(17.8) 44 (22.3) 13(6.6) 105(53.3)
In case you have a child 3 to 5 years of age– how can you check the vision? Only red reflex By slit lamp examination By fundoscopic examination *By optotypes/ E-chart (Snellen chart)	 20(10.2) 31(15.7) 23(11.7) 123(62.4)
In the case of a child aged 6 to 8 years–what from the following is preferred to do? Should do red reflex Routine referral to an ophthalmologist *Examine whenever complaints occur No need to do any test only history and reassurance	 36(18.3) 57(28.9) 76(38.6) 28(14.2)
According to referral criteria, when it should be urgent to refer a newborn 3 months of age to the ophthalmologist? An infant with risk of retinopathy of prematurity Having abnormal red reflex Presence of corneal opacity *All of the above	 3 (1.5 %) 11 (5.6 %) 6 (3.0 %) 177(89.8 %)
According to referral criteria, when should you refer an infant aged 6 -12 months to the ophthalmologist? An infant with chronic tearing, discharge Infant with nystagmus Infant with strabismus *All of the above	 10(5.1 %) 6(3.0 %) 13(6.6 %) 168(85.3 %)
*The correct option for each main question	

No statistical association was found between the amblyopia level of awareness and participants' demographic data. (Table 5).

Table 5: Comparison Between the level of awareness about amblyopia and participants' demographic characteristics, (N=197).

Variable		Awareness level		P-value
		Poor N (%)	Good N (%)	
Gender	Male	7(7.4)	87(92.6)	0.23
	Female	12(11.7)	91(88.3)	
Nationality	Saudi	13(10.8)	107(89.2)	0.33
	Non-Saudi	6(7.8)	71(92.2)	
Age group	25-35 Years	15(12.8)	102(87.2)	0.21
	36-45 Years	3(5.4)	53(94.6)	
	46-55 Years	0(0)	17(1)	
	> 55 Years	1(1)	6(85.7)	
Last Qualification	Family Medicine Consultants	0	17(1)	0.52
	Family Medicine Diploma	1(7.14)	13(92.8)	
	Family Medicine Residents	7(10.6)	59(89.3)	
	Family Medicine Specialists	4(8)	46(92)	
	GP	7(14)	43(86)	
Place of work	PHCCs	18(11.1)	144(88.8)	0.11
	Hospital	1(2.9)	34(97.1)	
Years of Experiences group	≤1 Year	4(20)	16(80)	0.06
	1-5 Years	9(14)	55(85.9)	
	6-10 Years	4(10.8)	33(89.1)	
	11-20 Years	1(1.5)	64(98.4)	
	> 20 Years	1(9)	10(90)	

Discussion

Amblyopia is a condition that permanently affects the vision of children if not treated early, and it could later impact their health and quality of life (15). Early detection and treatment of amblyopia can improve the chances of a successful visual outcome (16). Good physicians' knowledge and Parents' awareness about amblyopia and its risk factors could play a crucial role in the early management of the disease, which requires the involvement of both eye care professionals and the parents of the affected children. This study was conducted to assess the knowledge of PHC physicians and family medicine residents towards amblyopia in Qassim Region because of their major role in detecting and managing amblyopia.

This was a cross-sectional study that described the knowledge of PHC Physicians and FMA residents in Qassim region regarding amblyopia in children. The baseline knowledge scores showed that many questions were asked about the key issues related to amblyopia and vision screening. We focused on knowledge of physicians and residents based

on the Canadian Paediatric Society Recommendations for Vision Screening at Infant and Well Child Visits guidelines and the American Academy of Family physicians' guidelines (14).

In this study, the overall knowledge of physicians and residents about amblyopia was good (90%). This is the reverse of a study done in Alabama that reflected poor knowledge of physicians (17).

The study focused on assessing the knowledge about amblyopia and vision screening in well-child visits in primary health care. We found 55% of participants didn't know about vision screening guidelines, and the majority of them (70 %) had not diagnosed any case of amblyopia before.

Our study revealed that more than half of the physicians knew the global prevalence rate of

amblyopia, 2-4%. However, in previous studies, the prevalence rate of amblyopia was very high. In Aldebasi's study done in Qassim province, Saudi Arabia, the prevalence of amblyopia was 3.9% (6) and in the Alsaqr et al study done in Riyadh, it was 14% (18). In a study done in Uyoum Aljwa,

Saudi Arabia it was 12.5% (19), and in a study done in India, it was 25.5 % (20). This high prevalence rate of detection in Saudi Arabia needs further investigation.

Our survey showed that most physicians correctly knew the definition of amblyopia which is a decrease in best-corrected visual acuity resulting from abnormal vision development in infancy and early childhood according to the American Academy of Family Physicians. Although the majority of physicians knew it can be caused by refractive error, strabismus, or squint, few had known that cataract is one of the other causes of amblyopia. This is inconsistent with a previous study done in Riyadh that showed inadequate knowledge in parents (21).

Regarding the common presentation of children with amblyopia, the majority of participants knew that the presentation of amblyopia is usually asymptomatic. However, in a previous study done in Qassim region, the common presentation of amblyopia was refractive error especially anisometropia which means a difference in visual acuity (refractive error) between eyes leads to visual blurring of one eye and visual cortex suppression of the chronically blurred image (22).

In this survey, we assess the knowledge of the participants against Canadian paediatric society guidelines for vision screening and referral, especially in younger children. It found that less than two-thirds of physicians knew the visual acuity testing at age 3 months was by red reflex examination, which is inconsistent with a previous study in which the paediatricians do not follow the American Academy of Paediatrics guidelines (23). Research conducted in Ontario shows only 8 % of family medicine physicians do not assess red reflex, although it is critical that primary care physicians assess red reflex to avoid delay in diagnosis of retinoblastoma of which 59% is detected before age 5 years (24).

Furthermore, in assessing the physicians' knowledge regarding referral criteria to ophthalmologists for a baby aged 6 to 12 months most physicians knew that chronic tearing, discharge, nystagmus, strabismus, are the risk factors of retinopathy of prematurity and having abnormal red reflex, and the presence of cornea opacity are the conditions that need an urgent referral. This is opposite to a previous study in which one-fifth of physicians do not test acuity until age 5 years (25). In addition, half of the physicians knew the vision assessment tools for a baby aged 6 to 12 months. The majority of the physicians knew the treatment options correctly, as it is patching the good eye. This matches the findings written in the literature review (BMJ), where in mild to moderate amblyopia the first treatment line is patching, also in refractory (non-compliant) patients (26).

In this survey, more than two-thirds of the physicians knew the time of treating amblyopia cases, as it should be treated as early as possible before the age of 7 years. A previous study showed that amblyopia is more responsive to treatment among children younger than 7 years of age. Although the average treatment response is smaller in

children 7 to less than 13 years old (27). Another study showed there is an emotional impact of amblyopia treatment in preschool children, and that is not easy to implement and is commonly associated with some distress (28). Our study revealed that the attitude of the majority of the physicians towards a suspect case of amblyopia is that it should be referred to an ophthalmologist. Few said we will diagnose and manage at the level of PHC. A previous local study found anisometropia (especially anisohyperopia) is another potent stimulus for amblyopia that can be prevented by prescribing glasses in a timely fashion during the critical period of visual development; also, paediatric patients ought to be examined by paediatric ophthalmologists and optometrists who have a better approach to managing refractive errors and following the guidelines (29). In this study, we didn't find a statistical relationship between the physicians' demographic characteristics and the level of knowledge regarding amblyopia.

Conclusion

Early detection and treatment of amblyopia can improve the chances of a successful visual outcome. This study highlighted a good level of knowledge regarding amblyopia among both primary health care physicians and family medicine residence residents. No statistical relationship was detected between the amblyopia level of knowledge and participants' demographic data. Strategies for screening programs are highly needed.

Data availability statement: Data is available from the corresponding author on request.

Conflict of Interest: None declared.

Funding: Nil

Study limitations

Online surveys have their own set of obstacles and limitations, including small sample size and poor participation. In addition, multiple-choice questions have fixed selected responses that may fail to reflect clinical practice. In addition to the study area, the study was only conducted in Buraydah city at Qassim Region during the COVID-19 pandemic. This may affect the generalizability of the study findings. In light of those limitations, this study does not reflect the full range of knowledge in Saudi Arabia. Nevertheless, this is the only cross-sectional study that has attempted to assess knowledge of primary care physicians in Qassim region. The findings can serve as preliminary data to identify knowledge gaps that can help physicians to assess and detect amblyopia.

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