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Knowledge and attitudes toward amblyopia among parents in Madinah, Saudi Arabia: A cross-sectional study

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ABSTRACT

Objectives: This study aimed to assess the knowledge and attitude toward amblyopia among parents in Madinah City, Saudi Arabia. **Methodology:** A cross-sectional study was conducted among 385 parents in Madinah, Saudi Arabia from August 2021 to September 2021. The questionnaire had four parts: Socio-demographic data of the child's parents, knowledge-related questions contain participants' self-assessment questions, attitudes about amblyopia and if the participant has an amblyopic child. **Results:** A total of 385 parents were included in this study, of which 73.3% were mothers. Most of the mothers were bachelor's degree holder (62.7%) compared with only 41% of the fathers. Only 16.4% of the parents claimed to have adequate knowledge of amblyopia and nearly two-thirds (67.3%) did not know amblyopia. The correct definition of amblyopia was identified by 44.2% of the participants. The most frequently known causes were myopia and farsightedness (21.3%). The results showed that parents with an adequate knowledge of amblyopia were more likely to assent that amblyopia is curable with treatment compliance than those with inadequate knowledge (96.8% vs. 67.2%; $p < 0.001$). **Conclusion:** This study assessed the knowledge and attitude about amblyopia through parents in the Medina region, which will greatly influence early diagnosis and effectiveness of treatment. In this study, few participants had adequate knowledge of amblyopia. Thus, raising the level of awareness about amblyopia for early diagnosis is crucial to improve treatment outcomes.

Keywords: Amblyopia, Knowledge, Attitude, Medina, Saudi Arabia

1. INTRODUCTION

Amblyopia's definition is the X reduction of the best-corrected visual acuity in the absence of an ocular pathology that can be unilateral or bilateral. It develops during childhood and interrupts the normal development of the cortical visual pathway (Rebecca and Braverman, 2015). Amblyopia is main factor contributing to visual impairment in both children and adults (Mocanu

and Horhat, 2018). The incidence of amblyopia is approximately 1%–5% worldwide (Rebecca and Braverman, 2015). In the Kingdom of Saudi Arabia (KSA), most of the related studies have been conducted in the early 1990s and studied the local population. According to a study conducted in 2015, the incidence of amblyopia in Qassim province is 3.9% (Aldebasi, 2015). The risk factors of amblyopia can be divided into ocular and non-ocular. Ocular risk factors include refractive error, strabismus, anisometropia and congenital nasolacrimal duct obstruction. Non-ocular factors associated with amblyopia under investigation include maternal smoking during pregnancy, prematurity and neonatal intensive unit hospitalization (Mocanu and Horhat, 2018).

The failure to diagnose this condition early leads to various detrimental consequences on contrast sensitivity, binocular vision and visual acuity (Alsaqr and Masmali, 2019). The treatment of amblyopia is patching, ranging from 1 h to 24 h occlusion. The success rate of patching depends mainly on adherence and the reported average adherence ranged from 49% to 87%. The treatment of amblyopia includes depriving the vision of the good eye, eliminating suppression of the amblyopic eye and doing visual exercises that encourage recovery of the visual acuity of the affected eye (Basheikh et al., 2021). Few studies have measured the knowledge and awareness level of amblyopia in between parents in Saudi Arabia. In Riyadh, 36.3% of the parents were aware of amblyopia (Alhaddab et al., 2019). In Jeddah, two studies conducted in 2018 (Alzahrani et al., 2018) and 2021 (Alsaqr and Masmali, 2019) have reported an awareness rate of 49.7% and 25.9%, respectively. Another study conducted in various areas of Saudi Arabia showed that 70% of the parents had no knowledge about amblyopia eye (Basheikh et al., 2021).

Recently, in Al-Jouf, most of the parents had mild-to-moderate levels of knowledge of amblyopia (Alruwaili and Alzarea, 2021). Consequently, we expect that the awareness level of amblyopia in Medina, Saudi Arabia, would be low and further educational programs are needed to increase the knowledge and awareness of amblyopia in the area. Thus, this study pointed to measure the knowledge and attitude of amblyopia in between parents in Madinah City, KSA.

2. MATERIALS AND METHODS

This study is a cross-sectional survey was done amongst parents in Madinah city, KSA, from August 2021 to September 2021. Ethical approval number (22-090).

Study population and sampling

The sample size will be 385 participants, which was determined using an online calculator (calculator.net), with 50% ± 5% level of awareness at a confidence level of 95%. Saudi and non-Saudi parents, parents who live in and parents from all age groups were included. Non-parents and nonresidents of Madinah were excluded.

Measurements

This study used an adapted questionnaire from a study conducted in Jeddah after obtaining consent from the authors (Basheikh, 2021). The questionnaire was sectioned into four divisions: (1) Socio-demographic data of the participants and child's parents, (2) Knowledge-related questions contain participants' self-assessment knowledge, (3) Attitudes about amblyopia and (4) If the participant has a child with amblyopia. A questionnaire was distributed randomly among parents in Madinah through social media.

Data management and analysis plan

Data entry and statistical analysis were performed using IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, NY, USA). For knowledge statements, a score of "1" was assigned for correct responses, whereas a score of "0" was assigned to incorrect or do not know responses. The total score and its percentage were computed for each participant and those who scored <50% were considered to have "inadequate knowledge," whereas those who scored ≥50% were considered to have "adequate knowledge." Descriptive statistics were performed using frequency and percentage for categorical variables and arithmetic mean, range and standard deviation for continuous variables. The chi-square test was used to explore the association between two categorical variables, whereas Student's t-test and one-way analysis of variance (ANOVA) test were applied to compare the arithmetic means of a continuous variable between two groups or more than two groups, respectively and p-value <0.05 was considered as the statistical significance level.

3. RESULTS

The study included 385 parents. Their personal characteristics are summarized in Table 1. In addition, 62.7% of the mothers of the affected children were bachelor's degree holder compared with only 41% of the fathers. The age of the mothers ranged from 21 to 75

years, with a mean \pm SD of 42.5 ± 10.4 years, whereas the age of the fathers ranged from 23 to 94 years, with a mean \pm SD of 48 ± 11.7 years. The majority of the parents were Saudi nationals (92.7% and 93.5% of the mothers and fathers, respectively). Moreover, 52.2% of the mothers were housewives and 45.7% of the fathers were civilian employees.

Table 1 Personal characteristics of the respondents (n = 385)

	Frequency	Percentage
Person who filled out the questionnaire		
Father	59	15.3
Mother	283	73.5
Others	43	11.2
Maternal education		
Illiterate	8	2.1
Primary school	11	2.9
Intermediate school	28	7.3
Secondary school	70	18.2
Diploma	38	9.9
Bachelor	203	62.7
Postgraduate	27	7.0
Paternal education		
Illiterate	10	2.6
Primary school	18	4.7
Intermediate school	28	7.3
Secondary school	83	21.6
Diploma	45	11.7
Bachelor	158	41.0
Postgraduate	43	11.2
Maternal age (years)		
Range	21–75	
Mean \pm SD	42.5 ± 10.4	
Paternal age (years)		
Range	23–94	
Mean \pm SD	48.0 ± 11.7	
Maternal nationality (n = 384)		
Saudi	356	92.7
Non-Saudi	28	7.3
Paternal nationality (n = 382)		
Saudi	357	93.5
Non-Saudi	25	6.5
Maternal occupation		
Housewife	201	52.2
Teacher	103	26.8
Medical field	27	7.0
Retired	15	3.9
Administration/others	39	10.1
Paternal occupation (n = 377)		
Not working	6	1.6
Civilian employee	172	45.7
Military employee	35	9.3
Retired	59	15.6

Medical employee	36	9.5
Trading/business	41	10.9
Others	28	7.4

Awareness about amblyopia

As in Figure 1, only 16.4% of the parents claimed to have adequate knowledge of amblyopia. Nearly two-thirds of the parents (67.3%) had no information about amblyopia, whereas 20.8% of them obtained information about the disease from the Internet (Figure 2).

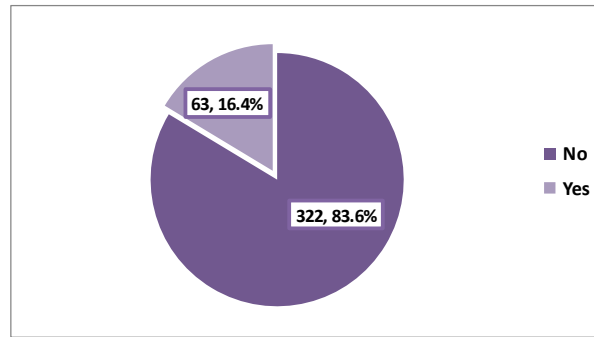


Figure 1 Participants’ perception of having adequate knowledge of amblyopia

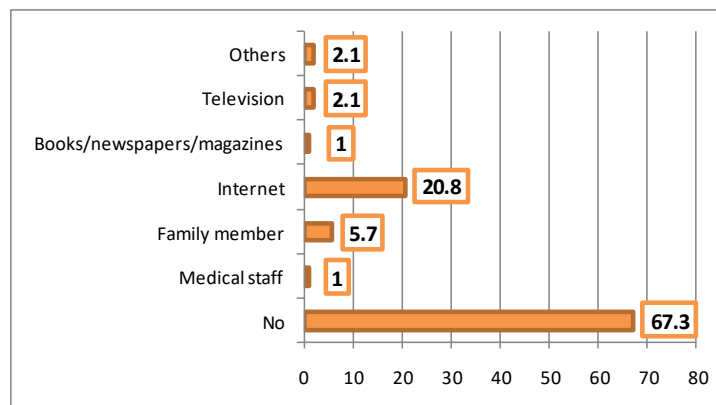


Figure 2 Source of information about amblyopia

History of having a child previously diagnosed with amblyopia

As in Figure 3, 8.6% of the parents reported to have a child previously diagnosed with amblyopia.

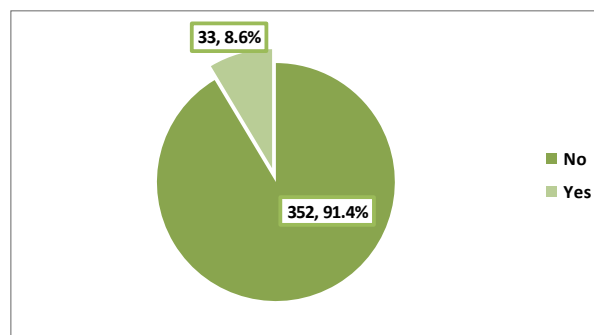


Figure 3 History of having a child previously diagnosed with amblyopia

Knowledge of amblyopia

In this study, 44.2% of the participants were able to identify the correct definition of amblyopia. The most frequently known causes were myopia and farsightedness (21.3%), myopia and farsightedness (18.2%) and corneal opacity (16.4%), whereas the least known

was astigmatism (2.6%). Concerning symptoms, monocular poor vision and eye deviation (misalignment) were recognized by 44.7% and 22.9% of the participants, respectively. Among risk factors for amblyopia, a family history of congenital cataract or strabismus was recognized by 33.5% of the participants, whereas premature birth was known by only 7.5%. Moreover, 33.2% of the participants recognized permanent and irreversible visual loss in the amblyopic eye as a complication of untreated amblyopia. Regarding methods for treating amblyopia, surgery and covering the healthy eye and treating the underlying cause were known by 21.8% and 30.6% of the participants, respectively. Most of the participants recognized that there is no inherited component to amblyopia (74.5%) and that the child’s age affects treatment response (62.6%), whereas only 32.2% knew that there is no need for lifetime therapy for amblyopia. Overall, nearly one-third of the participants (32.7%) demonstrated having adequate knowledge of amblyopia (Figure 4).

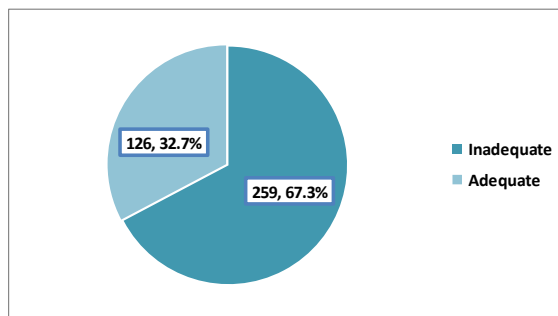


Figure 4 Overall level of knowledge of the participants about amblyopia

Compared with none of the illiterates, more than half (55.6%) of the postgraduate mothers expressed an adequate knowledge regarding amblyopia ($p = 0.012$). Moreover, 41.8% of bachelor’s degree holder fathers compared with none of illiterates had adequate knowledge regarding amblyopia ($p = 0.008$). Saudi mothers were more likely than non-Saudis to have adequate knowledge of amblyopia (34.6% vs. 10.7%; $p = 0.006$). Participants who self-perceived having adequate knowledge of amblyopia knew more about the illness than their peers (66.7% vs. 26.1%; $p < 0.001$). Three-quarters of the participants who had obtained information from books/newspapers/magazines compared with none of those who obtained information from medical staff expressed adequate knowledge ($p < 0.001$). Patients with a history of having a child previously diagnosed with amblyopia were more knowledgeable than their counterparts (51.5% vs. 31%; $p = 0.016$) (Table 3).

Table 2 Participants’ knowledge statements about amblyopia

	Correct answers		
	Response	Number	%
What is amblyopia?	Decreased vision in one eye due to the brain ignoring unclear image transmitted by the affected (lazy) eye and favoring the healthy eye	170	44.2
What are the causes of amblyopia?			
Squint (strabismus)	Yes	70	18.2
Congenital cataract	Yes	44	11.4
Droopy eyelid	Yes	60	15.6
Corneal opacity	Yes	63	16.4
Premature birth	No	150	39.0
Myopia and farsightedness	Yes	82	21.3
Astigmatism	Yes	10	2.6
Genetic factors	No	67	17.4
Eye injuries (trauma)	No	105	27.3
What are the symptoms of amblyopia?			

Poor vision in one eye	Yes	172	44.7
Eye deviation (misalignment)	Yes	88	22.9
Abnormal head postures	No	153	39.7
Coming close to the television when watching or bringing objects close to the eye when looking at them	No	143	37.1
Headache or eye strain	No	122	31.7
What are the risk factors for a child to develop amblyopia? One of the parents has or had congenital cataract, droopy eyelids, strabismus, myopia, or hyperopia	No	77	20.0
Family history (first-degree relatives) of congenital cataract or strabismus	Yes	129	33.5
Premature birth	Yes	29	7.5
What are the complications of untreated amblyopia?			
Permanent and irreversible vision loss in the affected eye	Yes	128	33.2
Loss of three-dimensional perception	No	102	26.5
What are the methods for treating amblyopia?			
Laser therapy	No	133	34.5
Surgery	Yes	84	21.8
Covering the healthy eye and treating the underlying cause	Yes	118	30.6
Covering the affected (lazy) eye and treating the underlying cause	No	215	55.8
Glasses only	No	137	35.6
Drops only	No	198	51.4
No treatment	No	210	54.5
Does the child's age affect the response to treatment?	Yes	241	62.6
Does amblyopia need lifetime therapy?	No	124	32.2
Do you think amblyopia is a hereditary disease?	No	287	74.5

Table 3 Factors associated with participants' knowledge of amblyopia

	Knowledge of amblyopia		p-value
	Inadequate N = 259 N (%)	Adequate N = 126 N (%)	
Maternal education			0.012*
Illiterate (N = 8)	8 (100)	0 (0.0)	
Primary school (n = 11)	7 (63.6)	4 (36.4)	
Intermediate school (n = 28)	21 (75.0)	7 (25.0)	
Secondary school (n = 70)	51 (72.9)	19 (27.1)	
Diploma (N = 38)	25 (65.8)	13 (34.2)	
Bachelor (N = 203)	135 (66.5)	68 (33.5)	
Postgraduate (N = 27)	12 (44.4)	15 (55.6)	
Paternal education			0.008*
Illiterate (N = 10)	10 (100)	0 (0.0)	
Primary school (n = 18)	12 (66.7)	6 (33.3)	
Intermediate school (n = 28)	20 (71.4)	8 (28.6)	
Secondary school (n = 83)	61 (73.5)	22 (26.5)	
Diploma (N = 45)	36 (80.0)	9 (20.0)	
Bachelor (N = 158)	92 (58.2)	66 (41.8)	

Postgraduate (N = 43)	28 (65.1)	15 (34.9)	
Maternal age			0.863**
Mean ± SD	42.5 ± 10.7	42.7 ± 9.8	
Paternal age			0.767**
Mean ± SD	47.8 ± 12.1	48.2 ± 10.9	
Maternal nationality (n = 384)			0.006°
Saudi (N = 356)	233 (65.4)	123 (34.6)	
Non-Saudi (n = 28)	25 (89.3)	3 (10.7)	
Paternal nationality (n = 382)			0.336†
Saudi (N = 357)	238 (66.7)	119 (33.3)	
Non-Saudi (n = 25)	19 (76.0)	6 (24.0)	
Maternal occupation			0.142 †
Housewife (N = 201)	146 (72.6)	55 (27.4)	
Teacher (N = 103)	65 (63.1)	38 (36.9)	
Medical field (n = 27)	14 (51.9)	13 (48.1)	
Retired (N = 15)	9 (60.0)	6 (40.0)	
Administration/others (n = 39)	25 (64.1)	14 (35.9)	
Paternal occupation (n = 377)			0.087 †
Not working (n = 6)	4 (66.7)	2 (33.3)	
Civilian employee (n = 172)	104 (60.5)	68 (39.5)	
Military employee (n = 35)	22 (62.9)	13 (37.1)	
Retired (N = 59)	43 (72.9)	16 (27.1)	
Medical employee (n = 36)	23 (63.9)	13 (36.1)	
Trading/business (n = 41)	34 (82.9)	7 (17.1)	
Others (N = 28)	22 (78.6)	6 (21.4)	
Personal perceiving of having adequate knowledge of amblyopia			<0.001†
No (N = 322)	238 (73.9)	84 (26.1)	
Yes (N = 63)	21 (33.3)	42 (66.7)	
Source of information about amblyopia			<0.001†
No (N = 259)	197 (76.1)	62 (23.9)	
Medical staff (n = 4)	4 (100)	0 (0.0)	
Family members (n = 22)	9 (40.9)	13 (59.1)	
Internet (N = 80)	39 (48.8)	41 (51.2)	
Books/newspapers/magazines (n = 4)	1 (25.0)	3 (75.0)	
Television (N = 8)	5 (62.5)	3 (37.5)	
Others (N = 8)	4 (50.0)	4 (50.0)	
History of having a child previously diagnosed with amblyopia			0.016†
No (N = 352)	243 (69.0)	109 (31.0)	
Yes (N = 33)	16 (48.5)	17 (51.5)	

*Chi-square test (linear-by-linear association)

†Chi-square test (Pearson)

**Independent samples t-test

°Fisher exact test

^{SD} standard deviation

Attitude toward amblyopia

Nearly one-quarter (26%) of the participants believed the need to take their child to an ophthalmologist for periodic routine checkups, whereas 43.6% believed that this should be done when an abnormal sign emerged. Most of the participants thought that amblyopia is curable if compliance to treatment (76.9%) and parents' role is a primary key in the management of amblyopia (77.9%) (Table 4).

Table 4 Attitude of the participants toward amblyopia

Statements	Frequency	Percentage
When it is necessary to take your child for an ophthalmology visit?		
When the child has complaints	117	30.4
When there is an abnormal sign	168	43.6
Periodic routine checkups	100	26.0
Do you think amblyopia can be cured if the child complies with the treatment?		
No	2	0.5
Yes	296	76.9
Do not know	87	22.6
Parents have an essential role in the treatment of amblyopia		
No	13	3.4
Yes	300	77.9
Do not know	72	18.7

Among the studied factors associated with the need for taking children to an ophthalmologist, only maternal age was a statistically significant factor, as 48.2% of the postgraduates compared with 14.3% of intermediate school-educated parents believed the need for taking their child to an ophthalmologist on periodic routine checkups ($p = 0.030$) (Table 5).

Table 5 Factors associated with the attitude of parents toward the necessity of taking their children for an ophthalmology visit

	It is necessary to take your child for an ophthalmology visit			p-value
	When the child has complaints N = 117 N (%)	When there is an abnormal sign N = 168 N (%)	Periodic routine check-ups N = 100 N (%)	
Maternal education				
Illiterate (n = 8)	2 (25.0)	4 (50.0)	2 (25.0)	0.030*
Primary school (n = 11)	5 (45.5)	2 (18.2)	4 (36.3)	
Intermediate school (n = 28)	14 (50.0)	10 (35.7)	4 (14.3)	
Secondary school (n = 70)	20 (28.6)	29 (41.4)	21 (30.0)	
Diploma (n = 38)	18 (47.4)	14 (36.8)	6 (15.8)	
Bachelor (n = 203)	53 (26.1)	100 (49.3)	50 (24.6)	
Postgraduate (n = 27)	5 (18.5)	9 (33.3)	13 (48.2)	
Paternal education				
Illiterate (n = 10)	4 (40.0)	4 (40.0)	2 (20.0)	0.745*
Primary school (n = 18)	5 (27.8)	7 (38.9)	6 (33.3)	
Intermediate school (n = 28)	10 (35.7)	12 (42.9)	6 (21.4)	
Secondary school (n = 83)	29 (34.9)	37 (44.6)	17 (20.5)	
Diploma (n = 45)	12 (26.7)	18 (40.0)	15 (33.3)	
Bachelor (n = 158)	41 (25.9)	70 (44.3)	47 (29.7)	
Postgraduate (n = 43)	16 (37.2)	20 (46.5)	7 (16.3)	
Maternal age				
Mean ± SD	42.8 ± 8.9	42.7 ± 11.2	42.5 ± 10.4	0.757°
Paternal age				
Mean ± SD	48.8 ± 10.7	47.4 ± 12.3	47.8 ± 11.9	0.612°
Maternal nationality (n = 384)				
Saudi (n = 356)	108 (30.3)	156 (43.8)	92 (25.8)	0.894*

Non-Saudi (n = 28)	9 (32.1)	11 (39.3)	8 (28.6)	
Paternal nationality (n = 382)				0.904*
Saudi (n = 357)	110 (30.8)	155 (43.4)	92 (25.8)	
Non-Saudi (n = 25)	7 (28.0)	12 (48.0)	6 (24.0)	
Maternal occupation				0.536*
Housewife (n = 201)	59 (29.4)	92 (45.8)	50 (24.9)	
Teacher (n = 103)	27 (26.2)	48 (46.6)	28 (27.2)	
Medical field (n = 27)	10 (37.0)	7 (26.0)	10 (37.0)	
Retired (n = 15)	6 (40.0)	5 (33.3)	4 (26.7)	
Administration/others (n = 39)	15 (38.5)	16 (41.0)	8 (20.5)	
Paternal occupation (n = 377)				0.778*
Not working (n = 6)	2 (33.3)	2 (33.3)	2 (33.3)	
Civilian employee (n = 172)	47 (27.3)	78 (45.3)	47 (27.3)	
Military employee (n = 35)	15 (42.9)	15 (42.9)	5 (14.3)	
Retired (n = 59)	18 (30.5)	27 (45.8)	14 (23.7)	
Medical employee (n = 36)	11 (30.6)	16 (44.4)	9 (25.0)	
Trading/business (n = 41)	9 (22.0)	19 (46.3)	13 (31.7)	
Others (n = 28)	11 (39.3)	9 (32.1)	8 (28.6)	
Personal perceiving of having adequate knowledge of amblyopia				0.201*
No (n = 322)	101 (31.4)	143 (44.4)	78 (24.2)	
Yes (n = 63)	16 (25.4)	25 (39.7)	22 (34.9)	
Source of information about amblyopia				0.100*
No (n = 259)	87 (33.6)	103 (39.8)	69 (26.6)	
Medical staff (n = 4)	3 (75.0)	0 (0.0)	1 (25.0)	
Family members (n = 22)	5 (22.7)	14 (63.7)	3 (13.6)	
Internet (n = 80)	21 (26.3)	39 (48.7)	20 (25.0)	
Books/newspapers/magazines (n = 4)	0 (0.0)	2 (50.0)	2 (50.0)	
Television (n = 8)	1 (12.5)	4 (50.0)	3 (37.5)	
Others (n = 8)	0 (0.0)	6 (75.0)	2 (25.0)	
History of having a child previously diagnosed with amblyopia				0.271*
No (n = 352)	107 (30.4)	150 (42.6)	95 (27.0)	
Yes (n = 33)	10 (30.3)	18 (54.5)	5 (15.2)	
Knowledge of amblyopia				0.086*
Inadequate (n = 259)	88 (34.0)	106 (40.9)	65 (25.1)	
Adequate (n = 126)	29 (23.0)	62 (49.2)	35 (27.8)	

*Chi-square test

*One-way analysis of variance (ANOVA) test

The majority of the postgraduate mothers and fathers (81.5% and 86%, respectively) compared with 50% of illiterate mothers and fathers believed that amblyopia can be with treatment compliance ($p = 0.031$ and 0.004 , respectively). Saudi mothers were more likely than non-Saudi mothers to assent that amblyopia is curable with treatment compliance (78.4% vs. 57.1%; $p = 0.010$). The majority of the fathers working in the medical field (83.3%) compared with those working in trading/business (58.5%) and those working in other jobs (57.1%) believed that amblyopia can be cured with treatment compliance ($p = 0.001$). Parents who perceived having adequate knowledge of amblyopia were more likely to assent that amblyopia is curable with treatment compliance (96.8% vs. 73%; $p < 0.001$). All parents who obtained their information about amblyopia from the medical staff compared with 72.2% of those without a specific source of information believed that amblyopia can be cured with treatment compliance ($p = 0.040$). The majority of the parents with a history of having children diagnosed with amblyopia (93.9%) compared with 75.3% of those without such a history believed that amblyopia can be cured with treatment compliance ($p = 0.008$). Parents with adequate knowledge of amblyopia were more likely than those with inadequate knowledge to assent that amblyopia is curable with treatment compliance (96.8% vs. 67.2%; $p < 0.001$) (Table 6).

Table 6 Factors associated with the attitude of parents toward the curability of amblyopia among children compliant to treatment

	Amblyopia can be cured with treatment compliance		p-value
	No/ Do not know N = 89 N (%)	Yes N = 296 N (%)	
Maternal education			0.031*
Illiterate (n = 8)	4 (50.0)	4 (50.0)	
Primary school (n = 11)	3 (27.3)	8 (72.7)	
Intermediate school (n = 28)	8 (28.6)	20 (71.4)	
Secondary school (n = 70)	19 (27.1)	51 (72.9)	
Diploma (n = 38)	9 (23.7)	29 (76.3)	
Bachelor (n = 203)	41 (20.2)	162 (79.8)	
Postgraduate (n = 27)	5 (18.5)	22 (81.5)	
Paternal education			0.004*
Illiterate (n = 10)	5 (50.0)	5 (50.0)	
Primary school (n = 18)	4 (22.2)	14 (77.8)	
Intermediate school (n = 28)	9 (32.1)	19 (67.9)	
Secondary school (n = 83)	24 (28.9)	59 (71.1)	
Diploma (n = 45)	12 (26.7)	33 (73.3)	
Bachelor (n = 158)	29 (18.4)	129 (81.6)	
Postgraduate (n = 43)	6 (14.0)	37 (86.0)	
Maternal age			0.153°
Mean ± SD	41.1 ± 11.3	42.9 ± 10.1	
Paternal age			0.155°
Mean ± SD	46.4 ± 12.3	48.4 ± 11.5	
Maternal nationality (n = 384)			0.010*
Saudi (n = 356)	77 (21.6)	279 (78.4)	
Non-Saudi (n = 28)	12 (42.9)	16 (57.1)	
Paternal nationality (n = 382)			0.519*
Saudi (n = 357)	80 (22.4)	277 (77.6)	
Non-Saudi (n = 25)	7 (28.0)	18 (72.0)	
Maternal occupation			0.067*
Housewife (n = 201)	57 (28.4)	144 (71.6)	
Teacher (n = 103)	18 (17.5)	85 (82.5)	
Medical field (n = 27)	7 (25.9)	20 (74.1)	
Retired (n = 15)	3 (20.0)	12 (80.0)	
Administration/others (n = 39)	4 (10.3)	35 (89.7)	
Paternal occupation (n = 377)			0.001*
Not working (n = 6)	2 (33.3)	4 (66.7)	
Civilian employee (n = 172)	29 (16.9)	143 (83.1)	
Military employee (n = 35)	11 (31.4)	24 (68.6)	
Retired (n = 59)	10 (16.9)	49 (83.1)	
Medical employee (n = 36)	6 (16.7)	30 (83.3)	
Trading/business (n = 41)	17 (41.5)	24 (58.5)	
Others (n = 28)	12 (42.9)	16 (57.1)	
Personal perceiving of having adequate knowledge of amblyopia			<0.001**
No (n = 322)	87 (27.0)	235 (73.0)	

Yes (n = 63)	2 (3.2)	61 (96.8)	
Source of information about amblyopia			0.040*
No (n = 259)	72 (27.8)	187 (72.2)	
Medical staff (n = 4)	0 (0.0)	4 (100)	
Family members (n = 22)	1 (4.5)	21 (95.5)	
Internet (n = 80)	13 (16.3)	67 (83.8)	
Books/newspapers/magazines (n = 4)	1 (25.0)	3 (75.0)	
Television (n = 8)	2 (25.0)	6 (75.0)	
Others (n = 8)	0 (0.0)	8 (100)	
History of having a child previously diagnosed with amblyopia			0.008**
No (n = 352)	87 (24.7)	265 (75.3)	
Yes (n = 33)	2 (6.1)	31 (93.9)	
Knowledge of amblyopia			<0.001**
Inadequate (n = 259)	85 (32.8)	174 (67.2)	
Adequate (n = 126)	4 (3.2)	122 (96.8)	

*Chi-square test *Student's t-test **Fisher's exact test

The majority of bachelor’s degree holder fathers (83.5%) compared with illiterate fathers (40%) believed in the importance of their part in the management of amblyopia (p = 0.007). Parents who perceived having adequate knowledge of amblyopia were more likely to believe in the importance of their part in the management of amblyopia than their peers (93.7% vs. 74.8%; p < 0.001). All parents who obtained their information about amblyopia from the medical staff, television and books/newspapers/magazines compared with those without a specific source of information (72.2%) believed in their role in the treatment of amblyopia (p = 0.010). The majority of the parents with a history of having a child diagnosed with amblyopia (90.9%) compared with of those without such a history (76.7%) believed in their part in the management of amblyopia (p = 0.040). Parents with adequate knowledge of amblyopia were more likely than those with inadequate knowledge to believe in their part in the management of amblyopia (94.4% vs. 69.9%; p < 0.001) (Table 7).

Table 7 Factors associated with the attitude of parents toward their role in the treatment of amblyopia among children

	Parents have an essential role in the treatment of amblyopia		p-value
	No/Do not know N = 89 N (%)	Yes N = 296 N (%)	
Maternal education			0.165*
Illiterate (n = 8)	4 (50.0)	4 (50.0)	
Primary school (n = 11)	4 (36.4)	7 (63.6)	
Intermediate school (n = 28)	9 (32.1)	19 (67.9)	
Secondary school (n = 70)	18 (25.7)	52 (74.3)	
Diploma (n = 38)	6 (15.8)	32 (84.2)	
Bachelor (n = 203)	39 (19.2)	164 (80.8)	
Postgraduate (n = 27)	5 (18.5)	22 (81.5)	
Paternal education			0.007*
Illiterate (n = 10)	6 (60.0)	4 (40.0)	
Primary school (n = 18)	3 (16.7)	15 (83.3)	
Intermediate school (n = 28)	10 (35.7)	18 (64.3)	
Secondary school (n = 83)	24 (28.9)	59 (71.1)	
Diploma (n = 45)	8 (17.8)	37 (82.2)	
Bachelor (n = 158)	26 (16.5)	132 (83.5)	
Postgraduate (n = 43)	8 (18.6)	35 (81.4)	

Maternal age			0.862°
Mean ± SD	42.7 ± 10.5	42.5 ± 10.4	
Paternal age			0.841°
Mean ± SD	48.2 ± 11.7	47.9 ± 11.7	
Maternal nationality (n = 384)			0.072*
Saudi (n = 356)	75 (21.1)	281 (78.9)	
Non-Saudi (n = 28)	10 (35.7)	18 (64.3)	
Paternal nationality (n = 382)			0.475*
Saudi (n = 357)	78 (21.8)	279 (78.2)	
Non-Saudi (n = 25)	7 (28.0)	18 (72.0)	
Maternal occupation			0.609*
Housewife (n = 201)	49 (24.4)	152 (75.6)	
Teacher (n = 103)	21 (20.4)	82 (79.6)	
Medical field (n = 27)	7 (25.9)	20 (74.1)	
Retired (n = 15)	2 (13.3)	13 (86.7)	
Administration/others (n = 39)	6 (15.4)	33 (84.6)	
Paternal occupation (n = 377)			0.073*
Not working (n = 6)	0 (0.0)	6 (100)	
Civilian employee (n = 172)	28 (16.3)	144 (83.7)	
Military employee (n = 35)	11 (31.4)	24 (68.6)	
Retired (n = 59)	15 (25.4)	44 (74.6)	
Medical employee (n = 36)	6 (16.7)	30 (83.3)	
Trading/business (n = 41)	11 (26.8)	30 (73.2)	
Others (n = 28)	10 (35.7)	18 (64.3)	
Personal perception of having adequate knowledge of amblyopia			<0.001**
No (n = 322)	81 (25.2)	241 (74.8)	
Yes (n = 63)	4 (6.3)	59 (93.7)	
Source of information about amblyopia			0.010*
No (n = 259)	72 (27.8)	187 (72.2)	
Medical staff (n = 4)	0 (0.0)	4 (100)	
Family members (n = 22)	3 (13.6)	19 (86.4)	
Internet (n = 80)	10 (12.5)	70 (87.5)	
Books/newspapers/magazines (n = 4)	0 (0.0)	4 (100)	
Television (n = 8)	0 (0.0)	8 (100)	
Others (n = 8)	0 (0.0)	8 (100)	
History of having a child previously diagnosed with amblyopia			0.040**
No (n = 352)	82 (23.3)	270 (76.7)	
Yes (n = 33)	3 (9.1)	30 (90.9)	
Knowledge of amblyopia			<0.001*
Inadequate (n = 259)	78 (30.1)	181 (69.9)	
Adequate (n = 126)	7 (5.6)	119 (94.4)	

*Chi-square test

°Student's t-test

**Fisher's exact test

4. DISCUSSION

The commonest cause of monocular vision loss in children is amblyopia. Amblyopia is defined as functional vision loss caused by abnormal visual cortex stimulation without structural anomalies or ocular disease. The parent and ophthalmologists have important roles in the management of child with amblyopia to get the best outcomes (Basheikh et al., 2021). This study was conducted to reveal the current parental awareness and attitudes in regard to amblyopia through parents in Madinah, Saudi Arabia.

Awareness about amblyopia

Figure 1 shows, only 16.4% of the parents have adequate knowledge of amblyopia. Interestingly, a study in Jeddah found that approximately half of the participants (49.7%) were aware of amblyopia (Basheikh et al., 2021). In addition, 67.3% of the parents had no information about amblyopia, whereas 20.8% of them obtained information from the Internet about the disease. A similar study in Tabuk demonstrated that (52.6%) of its participants chose the Internet and social media is the commonest information source (Alatawi et al., 2021). A study in Jeddah presented that relatives and friends are the main sources of knowledge of the disease (Basheikh et al., 2021).

History of having a child previously diagnosed with amblyopia

Figure 4 shows the history of having a child previously diagnosed with amblyopia reported by 8.6% of the participants, which is similar to the findings of the Tabuk study (12%) (Alatawi et al., 2021).

Knowledge of amblyopia

Less than a quarter of parents have adequate knowledge of amblyopia and 44.2% of them detect correctly the definition of amblyopia. While the study of Jeddah the majority of the parents were unaware of the correct definition of the disease (Basheikh et al., 2021). However, amblyopia-aware parents correctly perceived myopia and farsightedness as the major etiologies of the disease (21.3%). On the contrary, Aseer found that squinting is the most common disease cause (Alamri et al., 2021). Approximately 44.7% of the participants reported monocular poor vision and eye deviation (misalignment) as the main symptoms of amblyopia. It was similar Aseer study (Alamri et al., 2021). The most frequently identified risk factors of amblyopia were a family history of congenital cataracts and strabismus (33.5%). Permanent vision loss in the affected eye was recognized by 33.2% of the participants as a complication of untreated amblyopia. Half of the participants in the Jeddah study agreed that untreated amblyopia may lead to vision impairment, disability, stigmatization and impaired quality of life (Basheikh et al., 2021).

The present study showed that most of the participants (55.8%) thought about treating amblyopia by covering the affected (lazy) eye while the Jeddah study reported that amblyopia treatment involves the use of eyeglasses, patching of the healthy eye or a combination of both (Basheikh et al., 2021). Most of the participants could understand that there is no hereditary factor in amblyopia (74.5%) and the child's age influenced the treatment response (62.6%), whereas only 32.2% knew that amblyopia does not need a lifelong treatment, which is similar to the result of a study conducted in Jeddah (Basheikh et al., 2021). This study showed that the more educated the parents are, the more likely they are to have adequate knowledge of amblyopia. On the contrary, Basheikh et al., (2021) found no significant difference in the knowledge level between different educational degrees which could be due to different characteristics of the participants.

This study showed that Saudi mothers were more likely than non-Saudis to have adequate knowledge of amblyopia, which is similar to the findings of Basheikh et al., (2021) where Saudi mothers were significantly more knowledgeable than non-Saudis. The Internet, including social media, is the most mentioned source of information about amblyopia. Likewise, similar findings have been found by other studies and the source of information accounted 55.7% of the participants in Alzahrani et al., (2018), 58% in Alsaqr and Masmali, (2019) and 52.6% in Alatawi et al., (2021). Parents with a history of having a child previously diagnosed with amblyopia were found to be more knowledgeable than their counter parts. A study conducted in various area of Saudi Arabia found similar results, i.e., parents with amblyopic children had more awareness than parents of children without amblyopia (Alsaqr and Masmali, 2019).

Attitude toward amblyopia

In nearly one-quarter of the participants, 48.2% were postgraduate mothers and believed that it is necessary to take their children for an ophthalmology visit on periodic routine checkups, which is similar to the result of a study conducted in Jeddah, Saudi Arabia, in which 30.2% of the participants agreed to the necessity of ophthalmic routine checkups (Basheikh et al., 2021). Another study conducted by Alsaqr and Masmali, (2019) showed that 60% of the participants whose children were not examined regularly by ophthalmologists. The present study showed that most of the participants thought that amblyopia is curable if the child adheres to the management plan. Multiple studies have shown similar results; Alzahrani et al., (2018) found that 90.2% of the participants considered treatment compliance as either important or very important. Alamri et al., (2021) also reported that 68.0% of the parents believed that amblyopia is curable if the child adheres to the management.

Factors that play significant roles toward this attitude were maternal and paternal high educational levels, mothers' nationality, fathers working in medical fields, parents with adequate knowledge of amblyopia who obtained their knowledge from the medical

staff and parents who have children with amblyopia. In this study, most of the participants considered parents to be a primary key in the management of amblyopia and it is consistent with the results of Alzahrani et al., (2018) where 86.8% of the participants acknowledged the importance of parents' role in treatment efficacy. Educated parents have a better understanding of their role in the treatment. Newsham, (2000) reported that 68% of poorly knowledgeable parents are non-concordant to occlusion therapy in amblyopia. Having adequate knowledge of amblyopia and having an amblyopic child have a significant effect on the importance of parents' role in the treatment.

Limitations

The study has a few limitations. This is a questionnaire-based study; thus, the participants may misinterpret or do not understand some questions. In addition, the questionnaire was distributed via social media, excluding parents who do not use social media. Finally, the cross-sectional study design does not represent the sequence of events, but only reflects the presence of a relation between the factors and the outcomes.

5. CONCLUSIONS

This study assesses the knowledge and attitude regarding amblyopia among parents in the Medina region, which will greatly influence the early diagnosis and effectiveness of treatment. The study showed that few of the participants had adequate knowledge of amblyopia. Thus, there is a crucial need to raise the level of awareness about amblyopia for its early diagnosis early and therefore improve the treatment outcomes. Some interventions are needed to scale up the level of knowledge of amblyopia and maintain the reliability and quality of information, such as intensifying child health promotion campaigns and increasing physicians' involvement in patients' education through social media or during routine child visits for primary healthcare.

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Author Contributions

All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published.

Ethical approval

The study was approved by the Medical Ethics Committee of Health affairs in Madinah (Ethical approval code: 22090)

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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