

Awareness, Perceptions and Knowledge of Strabismus among Pediatrics and Ophthalmology Clinics Attendees in King Abdulaziz University Hospital, Jeddah.

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Received: January 2018

Accepted: February 2018

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ABSTRACT

Background: To assess the knowledge, awareness, and perception about strabismus and related disease dimensions among the parents and companions of children attending the pediatrics and ophthalmology clinic. **Methods:** A prospective cross-sectional study was carried out between 01 January and 31 July 2017 including the companions of children having strabismus who attended the Pediatrics and Ophthalmology clinics. A semi-structured questionnaire was developed to collect data. **Results:** The study included 474 companions of children (69.8% females). Knowledge about strabismus definition was correctly identified in 61.1%-74.6% of the participants. Heredity was the most frequently identified etiology (68.9%), followed by trauma (61.3%). Regarding treatment options, 63.6%, 60.6% and 47.8% of the participants correctly identified glasses, surgery and eye muscle exercise as possible options to treat strabismus, respectively. Most frequent knowledge sources were relatives and friends (69.8%) and the internet and social media (56.3%). Parents' role was highly appreciated as perceived by the participants, particularly for early detection (93.4%), diagnosis (92.0%), compliance with treatment (94.7%) and follow-up (92.4%). Both genders showed moderate knowledge about strabismus with a significantly higher level of knowledge in female participants ($P=0.001$). The Educational level had no impact on such parameter. **Conclusion:** There is high awareness level about different strabismus dimensions but with several misconceptions related to its psychosocial and economic consequences, a matter which could impact parent's vigilance and involvement in the therapeutic and preventive programs. It is necessary to target information messages and awareness programs in a comprehensive manner to all populations without an educational-based discrimination.

Keywords: Strabismus, awareness, knowledge, pediatric, Saudi Arabia.

INTRODUCTION

Strabismus is a disorder of eyes' alignment, in which the ocular visual axes are not simultaneously directed at a given object. Such misalignment is possibly present in a particular gaze direction or in all directions.^[1] The overall world prevalence of strabismus ranges from 2 to 4% among children with a slight increase (2-6%) in the Western countries.^[2-5] A Saudi study by Al Faran In 1994 revealed a 0.5% prevalence among schoolboys in Al-Baha Region.^[6] A more recent study in Riyadh revealed nearly the same rate (0.53%) among school-entrant children.^[7] However, in 2015, strabismus prevalence was much higher (38%) among clinic-attending children in Dammam.^[8]

Heterotropia is a clearly manifested strabismus form. The ocular deviation can be upward (hypertropia),

downward (hypotropia), inward (esotropia), or outward (exotropia). Being the commonest type, esotropia was extensively studied among several populations.^[9-12] It has been reported that the prevalence of strabismus is higher among the children of the same families as well as those born to consanguine parents.^[13,14] There are several causes of strabismus including refractive errors neurological diseases, glaucoma, and cataract; besides, life-threatening etiologies such as retinoblastoma. However, the incidence of childhood strabismus is associated with several other risk factors such as premature birth and maternal smoking.^[15] Early detection and correction of strabismus is essential before the brain attains full development in the growing child. Amblyopia, one of the critical complications of strabismus, was reported in about half of the strabismic children.^[16] Furthermore, untreated strabismus may lead to several other negative functional and cosmetic outcomes, resulting in psychosocial aspects such as deterioration of the child's self-confidence and social interaction with a significant deterioration of both child's and parent's quality of life.^[17]

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Therefore, insufficient parental knowledge, lack of information, and misconception about strabismus may impact the age of child's presentation to the eye specialist and subsequently the proposed management plan as well as its prognosis. There has been a great variation of those parameters from country to another and even from place to place within the same country.^[18] Up to our knowledge, studies concerned with studying such parental parameters among Saudi populations are scarce. In addition, despite the increased birth rates and the tendency for consanguinity in Saudi genetically-isolated populations, the knowledge about strabismus prevalence is still scarce.

This study attempted to provide a deep insight into knowledge, awareness, and perception of the parents or companions of children presenting to King Abdulaziz University Hospital, Saudi Arabia and the possible significant associated factors such as age, sex, and educational levels. Knowledge about strabismus definition, etiology, treatment options, and outcomes were investigated. In addition, perceptions about the parents' role in the main aspects related to the management of a child with strabismus were explored. The outcomes of the study would help plan the appropriate interventional programs to raise the awareness accordingly. This aims to fill knowledge gaps, to promote early referrals, aid in retaining patients' visual and cosmetic functions, and prevent the development of amblyopia and other unfavorable consequences.

MATERIALS AND METHODS

Population and setting

A prospective cross-sectional study carried out between 01 January and 31 July 2017 at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia. The study included male and female adult (age>18 years) companions of children (aged<14 years) attending the Pediatrics and Ophthalmology outpatient clinics for follow up of ophthalmologic or other health conditions.

Sampling

Sample size (N=289) was calculated to detect 75% of awareness level about strabismus (19), with 95% confidence interval, 80% statistical power and 0.05 type I error. The sample size was rounded to 300 then increased by 50% to adjust for eventual drop outs and missing data, resulting in a final sample size=450. Participants were recruited from the participating clinics using a convenience sampling method.

Study tool

A semi-structured questionnaire was developed by author for the purpose of the study including 6 parts: 1) demographic and socioeconomic data of the participants such as age, gender, relation to child

(parent, sibling, grandparent, other), household monthly income, family history of eye disease, etc.; 2) awareness about strabismus (1 item) and perception about its diagnosis and detection (3 items); 3) knowledge about strabismus with regards to 4 dimensions including definition (10 items), chart-based recognition of different types of strabismus and discrimination of normal eyes (6 items), possible etiologies (14 items), and treatment options (6 items); 4) perception about possible consequences and impact of strabismus including visual, psychosocial and economic aspects (10 items), using a 4-point likert-type agreement scale; 5) perception about parents' role in prevention, early detection, diagnosis, treatment efficacy, compliance with treatment, follow-up, psychological and social supports of the afflicted child, using a 5-point likert-type scale (1= not important at all to 5= very important); 6) sources of knowledge (internet and social media, doctor, relatives and friends, etc.).

The questionnaire was reviewed by one ophthalmologist and underwent face and content validity. Verbal consent was taken from participants prior to the interview. Both the study protocol and questionnaire were approved by the institutional review board of KAUH.

Statistical methods

Statistical analysis was performed with the Statistical Package for Social Sciences version 21.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to present participants' characteristics as well as the pattern of answers to the different questionnaire parts. Categorical variables are presented as frequency and percentage, while continuous variables are presented as mean \pm standard deviation (SD). Strabismus knowledge score (SKS, range 0-36) was calculated as the number of correct answers for questions relating to definition (10 items), recognition of different types and discrimination of normal eyes (6 items), etiology (14 items) and treatment option (6 items) of strabismus. Normality testing of SKS was carried out in the study population using Kolmogorov-Smirnov statistics=0.064 ($p<0.001$) and Shapiro-Wilk statistics =0.993 ($p=0.029$), concluding to non-normal distribution of the variable. Consequently, nonparametric tests including Mann-Whitney U and Kruskal-Wallis tests were used to analyze factors of strabismus knowledge; results are presented as mean SKS with significance level. A p value of <0.05 was considered to reject the null hypothesis.

RESULTS

Questionnaire reliability

Internal consistency of the knowledge-related subscales of the questionnaire showed Cronbach's alpha=0.825 (36 items). Internal consistency of other

subscales showed Cronbach's alpha=0.760 for perception about strabismus complications (10 items), 0.914 for perceived parent's role in strabismus management (8 items).

Population's characteristics

The study included 474 companions of children attending the Pediatrics (74.9%) and Ophthalmology (25.1%) departments, mean (SD) age=34.89 (9.75), 69.8% were females, 85.4% married and 94.9% living in urban area. Of the companions, 72.4% were parents, 12.0% siblings and 2.5% grandparents of the patients. Other sociodemographic characteristics showed that 37.3% had low economic status, 42.8% were unemployed, and the majority (54.2%) had high educational level. Family history showed 32.9% of eye diseases [Table 1].

Table 1: Participant's characteristics (N=474)

Parameter	Category	Frequency	Percentage
Clinic	Pediatrics	355	74.9
	Ophthalmology	119	25.1
Age (years)	Mean, SD	34.89	9.75
	(range=15; 82)		
Gender	Male	143	30.2
	Female	331	69.8
Marital status	Single	28	9.8
	Married	245	85.4
	Divorced	6	2.1
	Widow	4	1.4
Nationality	Saudi	311	65.6
	Non-Saudi	158	33.3
Residency	Urban	450	94.9
	Rural	19	4.0
Monthly income (SAR)	<5,000	177	37.3
	5,000-10,000	148	31.2
	10,000-15,000	102	21.5
	>15,000	36	7.6
Occupation	Employed	203	42.8
	Housewife	215	45.4
	Unemployed	41	8.6
	Retired	13	2.7
Educational level	Illiterate	16	3.4
	Up to middle school	70	14.8
	Secondary	129	27.2
	University or above	257	54.2
Number of children	None	37	7.8
	1-2	145	30.6
	3-5	186	39.2
	>5	69	14.6
Age of youngest child (years)	Median, 75th centile (range=0; 27)	3.00	5.00
Relation to child	Parent	343	72.4
	Sibling	57	12.0
	Grandparent	12	2.5
	Other	45	9.5
Family history of eye disease	No	313	66.2
	Yes	157	32.9

Values are frequency (percentage) unless indicated otherwise; SD: standard deviation; because of missing data some values do not sum up to the total.

Awareness and perception about strabismus and its diagnosis

Of the total participants, 7.8% declared being unaware of what strabismus is (awareness

rate=92.2%). Of the participants who were aware of strabismus, 76.4% believed strabismus can be detected by naked eye, only 56.5% believed it can be diagnosed by a GP or a family doctor, 45.3% that it can only be diagnosed by an eye specialist and 86.5% that it can be detected by parents. Further, only 44.4% are aware that it can be detected in both adults and children [Table 2].

Table 2: Awareness and perception about strabismus and its diagnosis

Parameter	Category	Frequency	Percentage
Awareness about strabismus	Yes	412	86.9
	No	37	7.8
	Not sure	25	5.3
Strabismus can be detected by naked eye	False	31	7.1
	True	334	76.4
	I dont know	63	14.4
Strabismus can be diagnosed by GP or family doctor	False	83	19.0
	True	247	56.5
	I dont know	98	22.4
Strabismus can only be diagnosed by eye specialist	False	153	35.0
	True	198	45.3
	I dont know	79	18.1
Strabismus diagnosis requires specific investigations	False	35	8.0
	True	271	62.0
	I dont know	122	27.9
Strabismus can be detected by parents	No	13	3.0
	yes	378	86.5
	I dont know	44	10.1
Persons exposed to strabismus	Adults	7	1.6
	Children	179	41.0
	Both adults and children	194	44.4
	I don't know	55	12.6

Because of missing data some values do not sum up to the total.

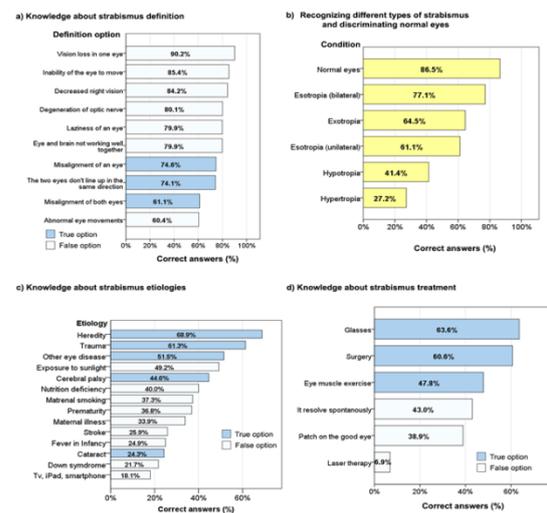


Figure 1: Knowledge about strabismus definition, etiologies, and treatment and recognizing different types of strabismus and discriminating normal eyes. Figure presents knowledge about different dimensions of strabismus among participants who declared being aware about the conditions (N=437). Knowledge dimensions explored include a) definition; b) chart-based recognition of different types of strabismus and discrimination of normal eyes; c) principal etiologies; d) treatment options.

Knowledge about strabismus

Assessment of knowledge was divided into 4 dimensions including definition, etiologies, recognizing different types of strabismus and discriminating normal eyes, and treatment. These were assessed among participants who declared being aware of strabismus. Results are presented in Figure 1 (a, b, c, d) as the percentage of participants who answered correctly to each item. Knowledge about strabismus definition showed that 61.1% to 74.6% of the participants correctly identified one of the three suggested correct definitions of strabismus including misalignment of both eyes, misalignment of one eye and “eyes do not line up in the same direction. On presentation of different charts, unilateral esotropia was the most frequently recognized type of strabismus (77.1%), followed by exotropia (64.5%) and bilateral esotropia (61.1%); whereas hypotropia and hypertropia were identified as strabismus by only 41.4% and 27.2%, respectively. On the other hand, 86.5% of the participants were able to discriminate normal eyes. Knowledge about etiologies showed that heredity was the most frequently identified as an etiology of strabismus (68.9%), followed by trauma (61.3%). More than 75% misidentified exposure to TV and smart devices, Down syndrome and fever in infancy as etiologies of strabismus. More than 50% misidentified other factors such as nutrition deficiency, exposure to sunlight, maternal smoking, prematurity and maternal illness, etc. as etiologies for strabismus; although some of these are actually risk factors. Knowledge about treatment options showed that 63.6%, 60.6% and 47.8% correctly identified glasses, surgery and eye muscle exercise as possible options to treat strabismus, respectively. Most frequent knowledge sources were relatives and friends (69.8%) and the internet and social media (56.3%), while doctors and awareness campaigns were reported by only 38.9% and 27.9% of the participants [Figure 2].

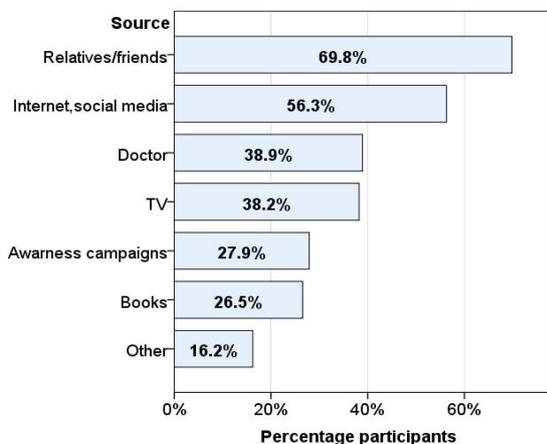


Figure 2: Sources of knowledge about strabismus. Bars represent the percentage of participants who declared having the given item as a source of knowledge about strabismus.

Table 3: Perception and attitude about strabismus complications and treatment outcomes.

Perception about treatment outcomes	No/False		Yes/True		Do not know			
	N	%	N	%	N	%		
There is no treatment for it	350	80.1	27	6.2	60	13.7		
Early treatment leads to better outcomes	12	2.7	389	89.0	36	8.2		
Strabismus is best treated at young age	18	4.1	380	87.0	39	8.9		
Strabismus worsens if left untreated	33	7.6	315	72.1	89	20.4		
The cause should always be treated to prevent relapse	15	3.4	352	80.5	70	16.0		
Perception about Strabismus complications and impact	Strongly disagree		Disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%
Decreased visual acuity	24	5.5	75	17.2	29	6.6	40	9.2
Double vision	17	3.9	72	16.5	27	6.3	60	13.7
Lazy eye	20	4.6	125	28.6	24	5.6	28	6.4
Disability	43	9.8	206	47.1	15	3.4	14	3.2
Stigmatization	13	3.0	115	26.3	23	5.3	72	16.5
Impaired quality of life	24	5.5	155	35.5	20	4.7	47	10.8
Negative impact on family	42	9.6	185	42.3	17	4.0	28	6.4
Anxiety, Depression	27	6.2	141	32.3	22	5.2	34	7.8
School failure	52	11.9	221	50.6	13	3.1	21	4.8
Economic burden (family)	65	14.9	218	49.9	12	2.8	22	5.0

Because of missing data some values do not sum up to the total. N: number; % percentage; percentages are calculated on participants who declared being aware of strabismus.

Perceptions about strabismus complications and treatment outcomes

Majority of participants who declared being aware of strabismus believed that early treatment leads to better outcomes (89.0%), that strabismus is best treated at a young age (87.0%), and that it worsens if left untreated (72.1%). Respondents’ perception was more discrepant regarding possible impact and complications of strabismus, as approximately 60%-75% agreed or strongly agreed that strabismus may

cause eye complications and vision impairment, while a minority (<50%) believed it can cause disability, negative impact on family, school failure and economic burden [Table 3].

Perceived parent's role in strabismus management Majority (82.4% to 94.7%) of the participants perceived the parents' role in strabismus as being important or very important, particularly in the following dimensions: early detection (93.4%); diagnosis (92.0%); treatment efficacy (90.6%); compliance with treatment (94.7%); and follow up (92.4%). It is worth noting that approximately 15% may not consider the role of patients in prevention [Table 4].

Table 4: Perceived parents' role in strabismus, in different dimensions

Dimension	Not important at all		Not important		Some what important		Important		Very important		A
	N	%	N	%	N	%	N	%	N	%	
Prevention	9	2.1	2	5.3	4	9.0	1	3.3	1	4.8	8
Early detection	1	0.2	4	9.9	1	4.3	1	3.7	2	5.4	9
Diagnosis	2	0.5	4	9.9	2	5.4	1	4.7	2	5.1	9
Treatment efficacy	1	0.2	9	21.1	2	5.6	1	4.7	2	5.0	9
Compliance with treatment	0	0.0	3	7.7	1	3.4	1	3.7	2	5.8	9
Follow up	0	0.0	4	9.9	2	5.4	1	3.7	2	5.7	9
Social support	8	0.9	9	30.0	2	5.7	1	3.7	2	5.8	8
Psychological support	4	1.8	1	2.3	2	6.2	1	3.7	2	5.8	8

Cronbach's alpha of this part of the questionnaire=0.914 (8 items); A: important or very important (percentage).

Factors associated with knowledge about strabismus

Based on the number of correct answers, knowledge level was statistically associated with gender as it was higher among females versus males (mean±SD SKS=10.07±3.91 versus 17.71±4.65; Mann-Whitney U test). It was also higher among parents (p<0.001) and participants with a family history of eye disease (p=0.001), by comparison to their counterparts. No statistically significant association with age, (p=0.104, linear regression), residency area (p=0.098), economic status (p=0.319) or educational level (p=0.400) was observed. Similarly, knowledge

source did not influence knowledge level (p>0.050) [Table 5].

Table 5: Factors of knowledge about strabismus.

Parameter	Category	Knowledge level (SKS)		p-value
		Mean	SD	
Age (years)	(B, r)	-0.034	0.078	.104
Gender	Male	17.71	4.65	.001*
	Female	19.07	3.91	
Marital status	Single	17.90	4.17	.147
	Married	18.80	4.15	
	Divorced	18.64	5.27	
	Widow	16.29	4.19	
Nationality	Saudi	18.68	4.28	.647
	Non-Saudi	18.64	4.03	
Residency	Urban	18.71	4.07	.098
	Rural	16.44	6.07	
Monthly income (SAR)	<5,000	18.39	4.04	.319
	5,000-10,000	19.21	4.28	
	10,000-15,000	18.73	4.03	
	>15,000	17.89	5.11	
Occupation	Employed	18.63	4.58	.164
	Housewife	19.00	3.85	
	Unemployed	17.68	3.63	
	Retired	17.42	3.87	
Educational level	Illiterate	17.55	4.11	.400
	Up to middle school	18.53	4.13	
	Secondary	18.42	4.19	
	University or above	18.87	4.21	
Number of children	None	17.78	3.34	.276
	1-2	19.02	4.06	
	3-5	18.90	3.98	
	>5	18.19	5.01	
Relation to child	Parent	19.18	3.88	<.001*
	Sibling	16.68	3.95	
	Grandparent	15.80	4.18	
	Other	18.79	5.13	
Family history of eye disease	No	18.12	4.17	.001*
	Yes	19.59	4.06	
Knowledge source				
Internet, social media	No	18.78	4.46	.596
	Yes	18.56	4.00	
Doctors	No	18.59	4.25	.716
	Yes	18.76	4.14	
Relatives / friends	No	17.98	4.67	.114
	Yes	18.93	3.96	
TV	No	18.37	4.36	.240
	Yes	19.10	3.91	
Books	No	18.48	4.20	.532
	Yes	19.12	4.21	
Awareness campaigns	No	18.69	4.12	.916
	Yes	18.53	4.42	

SKS: Strabismus knowledge score (range=5-31); * statistically significant result (p<0.05); test used; Mann-Whitney U test for factors with binomial variables and Kruskal-Wallis test for factors with multinomial variables; B: unstandardized regression coefficient; r: correlation coefficient.

DISCUSSION

Ophthalmologists and eye health professionals play a significant role in the investigation of the ocular movement disorders as well as providing the basic information related to the identified disease in order to best deal with the condition. However, their role should be enclosed in a larger team including the parents and/or companions to focus the care on the

affected child. This study attempted to reveal the current perception status regarding strabismus among the attendees of ophthalmology and pediatric clinics at King Abdulaziz University Hospital in Jeddah through a specifically-adapted questionnaire. Questionnaire's reliability analysis showed high internal consistency for the major studied subscales as shown by Cronbach's alpha value >0.700 .^[20] Importantly, the most significant reliability score was related to the different dimensions of the perceived parents' role in strabismus (Cronbach's alpha = 0.914, 8 items). Parents constitute the pillar of child's eye care as they are the first detectors of strabismus and subsequently they work closely with the ophthalmologists for their child's care. This can be clearly observed through the fact that the highest perception percentiles were reported for the dimensions of early detection (93.4%) and compliance to treatment (94.7%). In particular, females are the most effective participants as their lack of knowledge that strabismus is a treatable disease would negatively impact its detection and treatment. As such, focusing on the maternal role, including providing social and psychological support, is important as the female attendees constituted about two-thirds of the study population. This study showed a high degree of awareness about strabismus among the attendees (86.9%) although there was a misconception of providing an accurate definition of the disease. Most of the participants in this study inadequately perceived strabismus as either vision loss in one eye or inability to of the eye to move. Almost all of the participants in focus group discussions held by Bodunde et al.^[21] heard about strabismus. More than half of the parents (57.1%) in a study conducted by Ebeigbe and Emedike were aware of the importance of coordination of both eyes for appropriate vision and they knew that the condition would affect the relationship of the child with other children.^[22] A questionnaire-based study performed in an eye clinic in a rural area in Nigeria,^[19] revealed a higher awareness of 76.4% among the presenting patients with a significant awareness level in female participants. In the present study, females showed better knowledge about strabismus than males although both genders had acceptable knowledge levels. A high proportion of the participants (86.5%) perceived that strabismus can be detected by the parents, while 45.3% of them thought that it can be only identified by an eye specialist. Actually, the latter pattern of perception might lead to a significant delay in diagnosis and management as the parents would wait for a specialist rather than presenting their child to a family doctor. Therefore, it is necessary for the parents to report all observed eye abnormalities once detected to the physicians, including ophthalmologists, family doctors, and general practitioners. Even with the lack of such reporting, healthcare professionals have the

responsibility of performing systematic screening for strabismus in children.

Strabismus may be hereditary and noticed during the first year of life or may develop later due to other etiologies such as trauma or neuromuscular defects. In addition, farsighted children may have strabismus when they reach three to six years of age.^[23] Strabismus may be an early sign of retinoblastoma or brain tumors. The participants of this study showed a high degree of knowledge of strabismus etiologies, revealing the hereditary factor as the most significant cause, then trauma, and other eye diseases. However, the study of Isawumi and colleagues showed that eye-related diseases constitute the major etiology of strabismus as perceived by the participants. Some traditional misbeliefs were reported when the women of child-bearing age stated during Nigerian Focus Group Discussions that some postures during pregnancy,^[19,21] such as lying supine, may lead to strabismus development in the infants. This is consistent with the misconceptions of 5% of the women in another study of the same country.^[19] Strabismus treatment aims to restore binocular vision. Eyeglasses can be prescribed and other treatment options may include patching of the dominant eye or even performing surgical procedures. The primary objective of surgical interventions is to properly align the visual axes. Subsequently, surgery would improve patient's head posture, expand and centralize the visual field, restore vision acuity, and eliminate diplopia.^[24-28] Importantly, the normal appearance of the patient would be restored and, therefore, this would enhance his/her self-esteem and the overall quality of life. However, the base thoughts of the parents related to performing surgical operations to their child may render a significant delay in presentation. This might eventually lead to multiple negative effects on the quality of life of the parents.^[17] Regarding strabismus treatment dimension in the present study, participants' perceptions were modestly directed towards wearing glasses and surgical approaches rather than eye muscle exercise. Surgical treatment (24.8%) and medical therapy (20.2%) were reported as the prevalent perceived treatment options in another study.^[19] On the other hand, parents' knowledge about strabismus therapy was poor in a recent study,^[22] with eye exercise as the predominantly perceived treatment option (17.1%). Information source is an extremely important dimension that should be considered while designing relevant preventive or screening programs. Gaining knowledge from the relative or friends was the predominant source of providing knowledge about strabismus. Interestingly, internet and social media constituted a considerable proportion of knowledge sources. This was typically consistent with another study in India where both relatives and the internet were the reliable sources of knowledge although

most of the participating parents (60%) had low educational levels.^[17] An early study in London has shown that the verbal information provided by the ophthalmologists had a superior role in providing adequate knowledge to the parents rather than those acquired from family support discussions and the internet.^[29] However, the substantial increase in internet usage along with the expanding role of social media might represent a vital source of information. In addition, with continuously updated information and the participation of highly-skilled professionals, the reliance on the internet as an accurate and consistent source of might be of highly-beneficial effect. Regarding parents' education, our study did not reveal an association between the educational level and knowledge about strabismus. For doctors, a considerable time should be spent explaining the natural history of a certain form of strabismus as the well as the importance of treatment efficacy and aspects considered during occlusion therapy.^[30] This could be valuable as the parents with frequent visits to ophthalmology clinics have better knowledge about the diseases than new attendees.^[22] Another screening strategy that may be cost-effective in detecting strabismus and raising parents' awareness is during systematic vaccination visits, where eye inspection can be carried out along with simple advice and information to parents. It is worthy to note that infantile strabismus should be managed as early as before 2 years of age in order to achieve the best results, particularly for infants with stereopsis.^[21] Untreated strabismus frequently leads to deficiency in the perception of binocular depth and amblyopia. It has been shown that the prevalence of strabismus-associated amblyopia ranged from 42.9% in Taiwanese elementary students^[31] to 58% among Tunisian children^[16]. In addition to such functional consequences, there are multiple aesthetic issues associated with the condition which can affect the emotional and psychosocial aspects of the patient in regards to self-image,^[32,33] relationships with peers,^[34] and social prejudice.^[35] Furthermore, the child-parent relationship is markedly affected as the child's psychological perception develops.^[18] Indeed, the effect of strabismus may extend to other aspects of child's life, including difficulties in schoolwork, participation and performance in sports, and self-confidence. Strabismic patients may experience negative social bias, depression, and ostracization^[36] and they have fewer chances to get employment particularly those with large angle horizontal strabismus^[37] In addition to personal and social effects, strabismus may render a high economic burden as it could account for about 13% of healthcare costs for children.^[38] In general, our participants showed a relatively adequate perception about the vision-related sequelae of strabismus, although its psychosocial and economic effects were underestimated.

Collectively, parents' knowledge and attitude regarding early detection and presentation to the doctor with subsequent timely management is a critical element in the endeavor to avoid adverse functional, psychological, social, and economic consequences. It is important for every school child to have a comprehensive eye examination, but this would be essentially dependent on the eye care seeking behavior of the parents.

CONCLUSION

There is high awareness level about strabismus along with moderate knowledge about its definition, different types, etiologies, and treatment options. There are also several misconceptions about related consequences, with inadequate awareness about the psychosocial impact of the disease on both the patients and their families, as well as about its economic burden on the families and society. Such misconceptions probably downplay the severity of the condition from the population's perspective, which may reduce parent's vigilance and involvement in both the prevention and management of strabismus. There is no impact of educational level on knowledge level, which indicates the need to target information messages and awareness programs in a comprehensive manner to all populations rather than exclusively focus on the parents with low educational levels. In our Saudi community, it is imperative to consider the findings of this study to be integrated into strabismus programs in order to fill the observed knowledge gaps to encourage early detection, presentation, and intervention as well as to provide adequate awareness about such disabling condition.

Acknowledgements

The authors would like to thank Lamis Alharbi, Shaza Alorabi, Waleed Bandar, Turki Alqarni, Asmaa Alzahrani, Furat Alrajhi, Fatemah Alhalawani, Layla Jamjoom, Rakan Aljaafary, Mohammed Kurban for their contribution to data collection.

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How to cite this article: Bukhari D, Alhibshi N, Alzahrani N, Aljohani M, Madani F. Awareness, Perceptions and Knowledge of Strabismus among Pediatrics and Ophthalmology Clinics Attendees in King Abdulaziz University Hospital, Jeddah. *Ann. Int. Med. Den. Res*. 2018; 4(2):OT12-OT19.

Source of Support: Nil, **Conflict of Interest:** None declared