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7 **Parents' Awareness of and Perspectives on Childhood Refractive Error**  
8 **and Spectacle Wear in Saudi Arabia**

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16 **Abstract**

17 **Objectives:** This study aimed to assess parents' awareness of and perspectives on childhood  
18 refractive error in Saudi Arabia. **Methods:** This cross-sectional study included parents from  
19 different regions of Saudi Arabia was conducted between October and November 2020 and  
20 included 358 parents. Data were collected using an online questionnaire that involved  
21 questions to assess parents' knowledge and perceptions of childhood refractive error and  
22 spectacle wear. **Results:** A total of 358 completed questionnaires were obtained in this study  
23 with a response rate of 85%. Almost 38.3% of parents reported that they had never heard of  
24 refractive error. One-third (33.7%) mentioned that uncorrected refractive error did not lead to  
25 visual impairment. The majority (74.0%) cited using eyeglasses as an effective way to  
26 manage childhood refractive error. Two-thirds (63.7%) stated that they did not receive any  
27 information about paediatric eye care. Better knowledge was associated with having a higher  
28 educational level, being female, and having an older age ( $p < 0.001$ ,  $p = 0.008$ , and  $p = 0.024$   
29 respectively). Regarding parents' perspective on spectacle wear, almost 13.7% felt that using  
30 eyeglasses affected their children's chances of learning. However, 82.7% supposed that  
31 eyeglasses did not affect their children's employment opportunities. Approximately 22.1%  
32 thought that using eyeglasses would decrease the eyes power resulting in childhood visual  
33 impairment. **Conclusion:** The level of awareness and perceptions of childhood refractive

34 error and spectacle wear was low among parents. Therefore, a policy is needed to improve  
35 the awareness and perception of key stakeholders such as parents and teachers. In turn such  
36 an improvement could play a crucial role in addressing the poor knowledge and bad  
37 perception of treatment for childhood refractive error.

38 **Keywords:** Childhood visual impairment; spectacle wear; parental attitudes; refractive error;  
39 paediatric eye care; psychological effect; vision care; Spectacle compliance.

40

#### 41 **Advances in Knowledge**

- 42 • The level of awareness and perceptions of childhood refractive error and spectacle wear  
43 was low among parents.
- 44 • A plan should be developed to raise parental awareness of childhood refractive error and  
45 the use of eyeglasses.
- 46 • A policy is needed to improve the awareness and perception of key stakeholders, such as  
47 parents and teachers. Such an improvement could help in developing a plan to change  
48 incorrect perspectives on and misunderstandings of the methods for treatment of  
49 childhood refractive error.

50

#### 51 **Application to Patient Care**

- 52 • To increase the knowledge of the community about childhood eye care education should  
53 be delivered through public media, radio, television, social media, and newspapers to  
54 increase the community's knowledge about the importance of early diagnosis and  
55 treatment of childhood eye disorders.
- 56 • Parents' awareness of childhood refractive error and related complaints may lead to the  
57 pursuit of early eye care for their children, which could result in prompt diagnosis and  
58 treatment of eye disorders and help decrease the causes of avoidable childhood blindness.
- 59 • Eye care professionals should help advance parental knowledge of childhood eye care.

60

#### 61 **Introduction**

62 Global estimates indicate that there are approximately 19 million visually impaired children  
63 worldwide. Of these children, 1.4 million are blind, 17.5 million have reduced vision and  
64 most are found in poor countries.<sup>1-3</sup> Visual disability due to uncorrected refractive error (RE)  
65 affects nearly 250 million individuals globally and published studies<sup>4-7</sup> have revealed that  
66 uncorrected RE was considered the leading cause of visual impairment. The World Health

67 Organization (WHO) reported that the main leading cause of childhood vision impairment  
68 worldwide is uncorrected RE and it estimated that approximately 80% of reduced vision  
69 could be prevented by early diagnosis and management.<sup>1,5,8</sup> There are several types of  
70 refractive error (ametropia), the most common of which are hyperopia, myopia, and  
71 astigmatism. This condition is the more prevalent among Asians and Europeans and less  
72 common among African children.<sup>3-7</sup>

73  
74 Studies<sup>4,9,10</sup> have shown that refractive error particularly myopia, affects more than one-third  
75 of the population globally; however, the exact cause is still unknown, and the common risk  
76 factors include inheritance, nutrition, indoor activities, near tasks, and the environment  
77 uncorrected RE has a significant effect on children and could limit their chances in regard to  
78 education, quality of life and efficiency.<sup>3,11</sup> Earlier studies<sup>11,12</sup> reported that compared to  
79 adulthood visual impairment is low in childhood, and it has a serious significant negative  
80 impact on the lifespan of children with an estimate of 60% of children dying within one year  
81 of becoming blind. Al Wadaani, et al. reported that the prevalence of childhood refractive  
82 error in Al Hassa, Saudi Arabia was 13.7%.<sup>13</sup> However, another study by Aldebasi<sup>14</sup> in the  
83 Qassim region of Saudi Arabia revealed that the prevalence of childhood RE was 16.3%.

84  
85 Therefore, increased parental awareness of the effect of paediatric uncorrected refractive  
86 error is particularly important and could help in prompt diagnosis and management of  
87 childhood eye conditions resulting in a decrease in childhood visual impairment (VI).<sup>15</sup> No  
88 previous studies have been conducted to assess parents' awareness of and perspectives on  
89 childhood RE and spectacle wear in Saudi Arabia. Thus, the current study focused  
90 specifically on the knowledge and feelings of parents towards childhood RE and spectacle  
91 wear because the awareness and beliefs of parents are critical for the success of interventions  
92 aimed at reducing childhood VI resulting from uncorrected refractive error.

## 93 94 **Methods**

95 The study was cross-sectional and included randomly selected parents aged between 21 and  
96 55 years old, who had children enrolled in public schools in different regions of Saudi Arabia  
97 (central, western, eastern, northern and southern regions). The study was conducted between  
98 October and November 2020 and included two schools from each region one for boys and the  
99 other for girls. The questionnaire was distributed by the selected schools through the social  
100 media groups of the parents. Data were collected through an online self administered

101 questionnaire that included questions to assess parents' knowledge and perceptions of  
102 childhood RE and spectacle wear based on a validated questionnaire by Alrasheed et al.<sup>7,8</sup>.  
103 The questionnaires were administered in Arabic.

104

105 The inclusion criteria for the study were parents who had children and agreed to participate in  
106 the study and who signed the consent form. The study samples were calculated by the  
107 following formula:  $N = (Z^2 \times P \times (1 - P)) / E^2$ .  $Z =$  at the 95% confidence level =  
108 1.96.  $P =$  outcome of the response assumed to be 50% for the parents' awareness of and  
109 perspectives on childhood RE and spectacle wear for the maximum sample size,  $E =$   
110 maximum acceptable sampling error = 5% or 0.05 in decimal notation:  $((1.96)^2 \times (0.5) \times$   
111  $(1 - 0.5)) / (0.05)^2 = 384$ . Given the result of 384 parents in addition to a 10% non-  
112 participation rate (38), the final sample for this study was estimated to be 422 parents.

113

114 Ethical approval for the study was obtained from the Biomedical Ethics Committee at Qassim  
115 University. The study was conducted based on the guidelines of the Declaration of Helsinki.  
116 The participants participated voluntarily and were free to withdraw from the study at any time  
117 without giving any reason. Data were collected using a validated questionnaire in Arabic,  
118 which was modified based on the literature review and previously published studies.<sup>7,8</sup> The  
119 questionnaire was checked and evaluated by eye care professionals (optometrists and  
120 ophthalmologists) and tested with a pilot study of 40 parents. The questionnaire included the  
121 following. Section one included the socio-demographic characteristics of the participants.  
122 Section two contained questions to assess parents' awareness of childhood RE. Section three  
123 covered parents' beliefs regarding RE and spectacle wear. This section included nine  
124 positive and negative statements to assess parents' attitudes and perceptions towards of  
125 childhood RE and spectacle wear. Section four included questions related to the prevention  
126 and management of childhood visual impairment due to uncorrected RE. Finally, data were  
127 entered into a Microsoft Excel 2016 spreadsheet, and then statistical analysis was performed  
128 by using SPSS version 22.0 Chicago, IL, USA. The information was tested for data entry  
129 mistakes and any lost values before conducting the analysis. Descriptive analyses were used,  
130 including the frequencies, proportions, means, and standard deviations of the data, and  $P$ -  
131 values  $< 0.05$  were considered statistically significant.

132

133

134

## 135 **Results**

136 A total of 422 parents from five different regions of Saudi Arabia were invited to participate  
137 in the study. However, 365 parents returned the questionnaires, and seven incomplete  
138 questionnaires were excluded; thus 358 completed questionnaires were included in this study,  
139 giving a response rate of 85%. The demographic characteristics of the respondents are  
140 summarized in Table 1. The study contained 200 (55.9%) females and 158 (44.1%) males,  
141 and their mean age was  $36.9 \pm 11.9$  (s.d.) years. Approximately 32.7% of the parents fell  
142 within either the 21-30 age group or the 31-40 age group 31.6%, while the lowest number of  
143 participants were more than 50 years of age (13.9%). Regarding the educational levels of the  
144 parents, 70.4% had a university degree or higher, 22.1% had secondary certification, and only  
145 7.5% had primary education.

146

147 A section of the questionnaire addressed parents' awareness of childhood RE. Approximately  
148 49.2% of the parents said that they knew about RE, while 38.3% reported that they had never  
149 heard of RE. The parents were asked whether they think that RE causes vision loss for  
150 children if it is untreated. Among the respondents, 55.5% mentioned that uncorrected RE led  
151 to VI, while 33.7% of parents said that uncorrected RE did not lead to VI. Concerning the  
152 question on the effectiveness of using spectacles in the management of, the RE vast majority  
153 of the parents (74.0%) cited using eyeglasses as a good way to manage childhood RE, while  
154 21% of the respondents reported that wearing spectacles was not good for managing  
155 childhood RE. Regarding the question about information related to childhood eye care, many  
156 of the parents 63.7% stated that they did not receive any information, while 33.2% of parents  
157 reported receiving some information about childhood eye care.

158

159 The participants were questioned whether they had taken their children for an eye  
160 examination. Approximately 54.2% of the respondents cited that they had taken their children  
161 for an eye examination; however, 41.6% reported that they had not taken their children for  
162 eye testing. Regarding the question, on whether their children were using any method of  
163 correcting RE, the majority (70.9%) of the parents stated that their children did not use any  
164 type of correction, while 27.9% mentioned that their children used glasses only 1.1% reported  
165 their children used contact lenses. All responses are detailed in Table 2.

166

167 Finally, a score was calculated for all the questions assessing the level of parental awareness  
168 toward childhood RE. The minimum score was 1 for the 'No' response, 2 for the 'I do not  
169 know the response, and 3 for the 'Yes' response. The average total score was then compared  
170 in terms of different demographic variables (gender, age, and educational level) using one-  
171 way ANOVA. The results revealed that female parents had a higher mean score ( $2.22 \pm 0.46$ )  
172 that was statistically significant ( $p = 0.008$ ). The 41-50 age group had a higher mean score for  
173 knowledge ( $2.30 \pm 0.43$ ) which was statistically significant with a  $p$ -value = 0.024. Parents  
174 with high educational levels had a higher score for awareness ( $2.1 \pm 0.45$ ) with a  $p$ -value <  
175 0.0001, as shown in Table 3.

176

177 The parents had a mixture of positive and negative answers to the questions concerning their  
178 perspectives towards using eyeglasses and childhood RE. To help in assessing parental  
179 attitudes and perceptions, in this part, 3-point Likert scale statements were used, with choices  
180 ranging from disagree to agree as shown in Table 4.

181

182 Most the parents (79.3%) felt that using eyeglasses did not affect their children's chances of  
183 learning (females 46.6% and males 32.7%). Meanwhile, 13.7% of the parents felt that using  
184 eyeglasses could affect their children's chances of learning (females 7.5% and males 6.2%).  
185 The difference in the attitudes of the parents was not statistically significant ( $p= 0.539$ ).

186 Almost 82.7% of the parents thought that wearing spectacles did not reduce their children's  
187 employment opportunities (males 34.4% and females 48.3%). However, only 14% of the  
188 participants thought that using eyeglasses could decrease their children's opportunities to find  
189 work, the difference in the attitudes of the parents was statistically significant ( $p= 0.048$ ).

190 Most of the parents (86.6%) supposed that using eyeglasses did not affect their children's  
191 chances of marriage in the future (females 50% and males 36.6%). Interestingly, only 11.5%  
192 of the parents believed that using eyeglasses could reduce their children's chances of marriage  
193 in the future (females 5.6% and males 5.9%). The parents were asked questions regarding

194 wearing eyeglasses for the management of refractive error, and 22.1% of them thought that  
195 wearing eyeglasses would reduce their children's vision (females 10.4% and males 11.7%).

196 Nevertheless, approximately 70.1% of the parents believed that wearing eyeglasses would not  
197 make their children's vision poor (females 44.3 and males 26%), and the difference in the  
198 attitudes of the parents was statistically significant ( $p= 0.005$ ).

199

200 Regarding the question on the psychological effect of wearing spectacles, almost 45.0% of  
201 the parents thought that wearing eyeglasses had a psychological effect on their children  
202 (males 20.7% and females 24.3%), while 49.7% of them felt that wearing eyeglasses had not  
203 psychological impact on their children (males 20.4% and females 29.3%). The difference in  
204 the perceptions of the parents was not statistically significant ( $p= 0.224$ ). Approximately  
205 39.7% of the parents believed that wearing eyeglasses could decrease their children's  
206 activities such as sports (males 19.3% and females 20.4%), while half of the parents thought  
207 that wearing eyeglasses did not affect their children's activities. Almost 65% of the parents  
208 agreed that wearing eyeglasses prevented their children from developing VI. However,  
209 approximately 24.0% disagreed that wearing eyeglasses would prevent their children from  
210 developing VI. The parents were asked questions regarding the effect of wearing glasses for a  
211 long time, approximately 65.9% of the participants thought that wearing eyeglasses for a long  
212 time did not harm their children's vision (28.2% males and 37.7% females), while only 24.3  
213 of parents believed that using spectacles for a long time would harm their child's eyes and  
214 result in early childhood blindness. The difference in the parents' perceptions was  
215 statistically significant ( $p= 0.008$ ). Most of the parents (59.5%) disagreed that for their  
216 children, wearing eyeglasses could relieve distress such as frontal headache (25.4% males  
217 and 34.1% females), while 28% of the respondents agreed that wearing eyeglasses would  
218 reduce eye discomfort.

219

220 The parents were questioned about where they could seek treatment for their children if they  
221 complained of symptoms of decreasing vision. A total of 48.3% of the parents stated eye  
222 doctors (ophthalmologists) in a public hospital, 21.5% ophthalmologists in a private clinic,  
223 21.2% optometrists in a public hospital, and 8.9% optometrists in a private clinic (Figure 1).  
224 The parents were asked about when their children's vision was last examined. Almost 40% of  
225 respondents reported that they had not had their children's vision tested before, and 35.8%  
226 stated that their children's vision was examined one year ago. The parents were asked to give  
227 the reason for not taking their children to eye care professionals in the past 12 months.  
228 Approximately 52.5% of the parents, reported that their child had no vision difficulties,  
229 21.1% reported that the vision examination was too expensive, and 14% reported that  
230 hospitals for the vision examination were far away (Figure 2).

231

232 **Discussion**

233 Childhood VI due to uncorrected RE can be avoided through preventive methods, and with  
234 periodic vision examinations and preliminary treatment. In industrialized countries, teenagers  
235 are required to undergo an eye test at birth, followed by six months of age.<sup>16,17</sup> After six  
236 months of age, an average child has reached numerous developmental milestones in his or her  
237 visual functions and can therefore undergo full vision function examinations. Then, a  
238 complete eye examination, such as visual functions and binocular vision, is essential  
239 at preschool age and frequently during school age.<sup>16</sup> Parents' awareness of childhood RE  
240 and related complaints may support the pursuit of vision care for their children in a timely  
241 manner, which could lead to prompt diagnosis and treatment of eye disorders and help reduce  
242 the causes of avoidable childhood blindness. Therefore, the current study aimed to assess  
243 parents' awareness of and perspectives on childhood RE and wearing eyeglasses in Saudi  
244 Arabia.

245  
246 In the current study, 38.3% of the parents stated that they did not know the term 'childhood  
247 RE.' This figure is lower than that shown by Sukati, et al.<sup>18</sup>, who stated that 53.1% of parents  
248 did not know the term 'childhood RE.' Parents need eye health education programmes to  
249 increase awareness and to correct misunderstandings of childhood RE. Furthermore, 33.7%  
250 of the parents thought that uncorrected RE could not cause childhood VI. This result is  
251 similar to a study in India, where 66.7% of the respondents accepted the use of spectacles.  
252 However, a considerable number of participants (30.5%) supposed that the use of eyeglasses  
253 was not an effective method for managing childhood RE.<sup>19</sup> Therefore, educational  
254 interventions to increase parental knowledge of the treatment and prevention of childhood VI  
255 due to uncorrected RE are important. In this study, almost 63.7% of the parents indicated  
256 that they had not obtained information related to childhood eye care. This result is higher than  
257 that reported based on Sudanese parents; almost 25% of the parents stated that they  
258 had not obtained information regarding childhood eye care.<sup>8</sup> The current study revealed that  
259 females had better knowledge than males, and this result was statistically significant ( $p =$   
260  $0.008$ ). The 41-50 age group had a higher mean knowledge score than the other age  
261 groups, and this result was statistically significant ( $p = 0.024$ ). Furthermore, knowledge of  
262 childhood RE was associated with the parents' educational level ( $p < 0.001$ ). Several  
263 authors have reported an association between the demographic characteristics (age, gender,  
264 and level of education) of patients and knowledge of childhood eye care. Aldebasi<sup>22</sup> reported  
265 that individuals with advanced educational levels showed knowledge of RE than those with  
266 elementary educational levels.<sup>16,20,21</sup>



267

268 In this study, a considerable proportion of parents supposed that wearing eyeglasses may  
269 affect their children's chances in regard to learning and employment. This result is similar to  
270 that found by Alrasheed et al.<sup>7</sup> who reported that parents felt worried that their children may  
271 develop vision impairment and have a dim future if they used eyeglasses. Almost 22.1%  
272 of the parents thought that using glasses would reduce the eyes' vision, which agrees with the  
273 results of studies conducted in Sudan<sup>7</sup> and Nigeria<sup>23</sup>, where 36.4% and 23.8% of  
274 parents, respectively, stated that spectacles would harm children's vision. In a survey  
275 conducted in southern California, most of the participants experienced distress, sadness, and  
276 anxiety when they realized that their children needed eyeglasses to improve vision at an early  
277 age.<sup>24</sup> Many doubts were stated by the parents in the present study, who mentioned that if  
278 their children were advised to use eyeglasses, they would feel that their children had lost their  
279 vision and had reduced activities, and that there was a psychological effect. Therefore,  
280 childhood eye care education should be delivered through public media, radio, television,  
281 social media, and newspapers to increase community's knowledge of and perspectives on  
282 childhood eye diseases and to understand the importance of early diagnosis and treatment of  
283 RE.

284

285 This study has some limitations. It was cross-sectional and was conducted  
286 online; therefore, the collected information was sometimes incomplete. To reduce the bias of  
287 the study, incomplete questionnaires were excluded from the study. Additionally,  
288 the participant response rate was slightly low, which reflects that not all the invited parents  
289 participated in the study. All the above-mentioned limitations notwithstanding, the current  
290 study provides information that could help health policy-makers and eye care professionals  
291 develop a childhood eye care education plan to improve parents' awareness of childhood eye  
292 care.

293

## 294 **Conclusion**

295 The level of awareness of childhood RE amongst parents in Saudi Arabia is low, and  
296 perceptions of eyeglasses as a method of RE management among parents are poor. Our  
297 findings show that there is a need to increase the community's knowledge of RE, and the  
298 importance of prompt detection and treatment, and to change incorrect perspectives and  
299 misunderstandings of the methods of treatment of childhood RE. Therefore, structured  
300 educational programmes through the mass media are necessary to increase knowledge

301 regarding the effect and treatment modalities for childhood refractive error and visual  
302 impairment. This study recommends that a policy is needed to improve the knowledge,  
303 attitudes, and practices of key stakeholders such as parents and teachers. In turn, such an  
304 improvement could play a crucial role in addressing the poor knowledge and bad  
305 perception of the treatment of childhood refractive error and spectacle wear in Saudi Arabia.

306

### 307 **Authors' Contribution**

308 SA and WA designed the study. WA drafted the manuscript. SA analysed and interpreted the  
309 results. Both authors discussed the results, commented on the manuscript and approved the  
310 final version of the manuscript.

311

### 312 **Conflict of interest**

313 The authors declare no conflicts of interest.

314

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- 396

397 **Table 1:** Demographic characteristics of the parents (N=358)

Characteristics	N	%
Gender		

Male	158	44.1
Female	200	55.9
<b>Age (in years-mean36.9± 11.9)</b>		
21 to 30	117	32.7
31 to 40	113	31.6
41 to 50	78	21.8
More than 50	50	13.9
<b>Educational level</b>		
Intermediate	27	7.5
Secondary	79	22.1
University degree or higher	252	70.4
<b>Total</b>	<b>358</b>	<b>100.0</b>

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**Table 2:** Parents' knowledge of refractive error

Question	Response	(N)	(%)
Have you ever heard of refractive error?	No	137	38.3
	I do not know	45	12.6
	Yes	176	49.2
Do you think that refractive error causes vision loss for children if it is untreated?	No	121	33.7
	I do not know	38	10.6
	Yes	199	55.5
Do you think that wearing spectacles is effective in the treatment of refractive error for children?	No	75	21
	I do not know	18	5.0
	Yes	265	74
Have you obtained any information related to child eye health?	No	228	63.7
	I do not know	11	3.1
	Yes	119	33.2
Have you ever taken your child for an eye examination?	No	149	41.6
	I do not know	15	4.2
	Yes	194	54.2
What does your child is use for the treatment of refractive error?	Glasses	100	27.9
	Contact lens	4	1.1
	None	254	70.9

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**Table 3:** Comparison of the mean knowledge score of the parents in terms of their age and educational level using one-way ANOVA

Characteristics		Mean	Std. Deviation	P Value
Gender	Male	2.0886	0.49119	0.008
	Female	2.2240	0.45834	
Age	less than 20	2.2833	0.51493	0.024
	21 to 30	2.0850	0.51948	
	31 to 40	2.1709	0.49425	
	41 to 50	2.3000	0.43019	
	More than 50	2.0894	0.33312	
Educational level	Intermediate	1.8545	0.55062	0.000
	Secondary	2.1846	0.45672	
	High education	2.1992	0.45994	

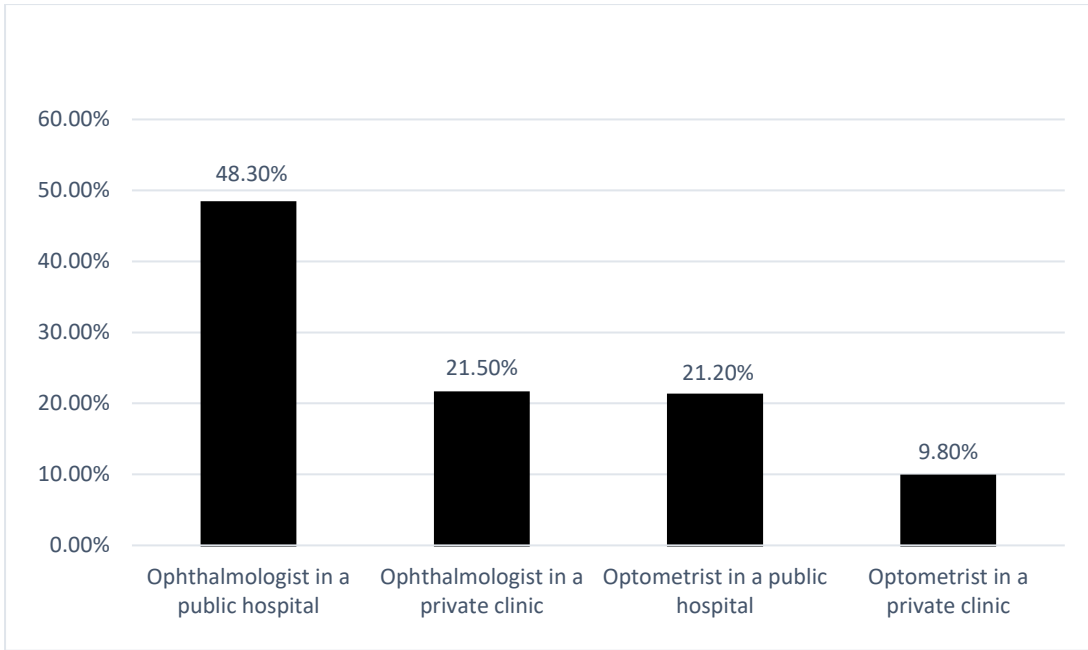
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410 **Table 4:** Parents' attitudes and perceptions towards RE and spectacle wear

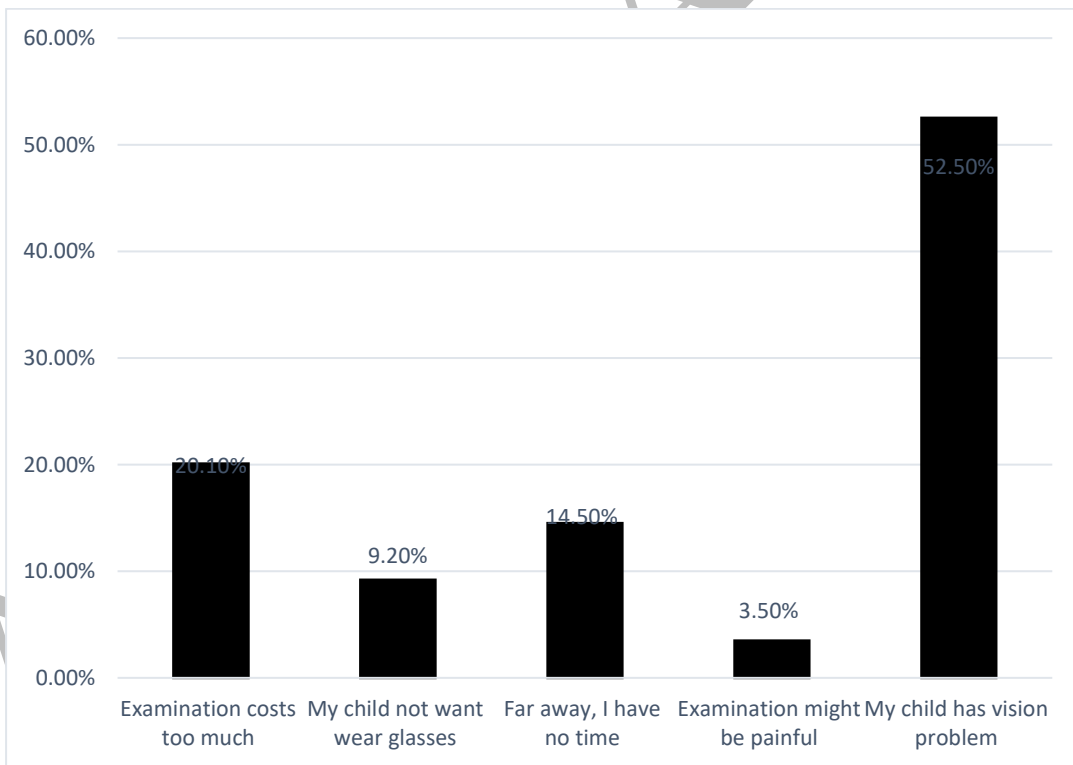
Statement	Disagree %	Agree %	Male		Female		p
			Disagree %	Agree %	Disagree %	Agree %	
I think wearing eyeglasses affects my child's opportunities for learning.	79.3	13.7	32.7	6.2	46.6	7.5	0.539
I think wearing eyeglasses could affect my child's chance of employment.	82.7	14.8	34.4	7.8	48.3	7	0.048
I think using spectacles may affect. my child's opportunity for marriage in the future.	86.6	11.5	36.6	5.6	50	5.9	0.229
I believe eyeglasses could reduce my child's vision.	70.1	22.1	26	11.7	44.3	10.4	0.005
I believe using eyeglasses has a psychological effect on children.	49.7	45.0	20.4	20.7	29.3	24.3	0.224
In my opinion, using spectacles could reduce child's activities such as sport.	52.8	39.7	21.2	19.3	31.6	20.4	0.061
I think the best way to prevent my children having vision loss is wearing eyeglasses.	24.0	65.6	12.8	25.4	11.2	42.2	0.058
In my opinion, wearing eyeglasses for a long time will harm the eyes and may result in early blindness.	65.9	24.3	28.2	12.3	37.7	12.1	0.008
In my opinion, spectacles may be used to relieve distress such as frontal headache, photophobia, and tearing.	59.5	27.9	25.4	12.6	34.1	15.4	0.563

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**Figure 1:** If your child feels symptoms of refractive error, where you seek treatment



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**Figure 2:** Reasons for parents did not visit an eye care professional for their children