

## Level of Awareness among Non-medical Students towards Keratoconus Abha, Kingdom of Saudi Arabia

**Abdulrahman Alamri\***

*Department of Ophthalmology, College of Medicine, King Khalid University, Saudi Arabia*

**\*Corresponding Author:** Abdulrahman Alamri, Department of Ophthalmology, College of Medicine, King Khalid University, Saudi Arabia.

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### Abstract

**Background:** Keratoconus is a progressive, bilateral, asymmetric, ectatic disease that leads to progressive corneal thinning and protrusion of the cornea, which results in progressive visual impairment and irregular astigmatism. Early detection is of great paramount to stop progression of the condition. Awareness of the population at risk improves early screening and utilization of eye care. The aim of the present study is to assess the level of awareness of non-medical students towards keratoconus Abha Kingdom of Saudi Arabia.

**Methods:** A cross-sectional study was conducted among the non-medical students from January 2019 to May 2019 in the Southern region of Saudi Arabia. A total of 393 non-medical students were randomly selected through the university admission deanship records. Close-ended questionnaires were circulated using the university official electronic mails.

**Results:** A total of 374 females and 19 males were responded. Among those who had poor awareness, majority were females (95.7%) and belonged to age group of 17 - 21 years (68.3%). Similar pattern was seen in study participants with fair awareness. However, 57.1% of the study participants with good awareness belonged to age group of 22 - 26 years.

**Conclusion:** Visual impairment is a common condition among young population. Onset and severity of keratoconus is diverse among countries. Early screening for the population at risk could hasten the appropriate medical intervention and reduce the burden of this condition. Level of awareness considered as a key factor for a better utilization of the eye health care.

**Keywords:** *Keratoconus; Non-Medical Students; Awareness; Saudi Arabia*

### Introduction

Keratoconus (KC) is a progressive, bilateral disease that leads to thinning and protrusion of the cornea which causes irregular astigmatism and visual impairment [1]. The term keratoconus was derived from the Greek words kerato-idis (cornea) and konos (cone). John Nottingham was the first author to describe keratoconus in 1854 [2]. Formerly, KC was classified as a non-inflammatory disease. Recently, multiple studies showed the critical role of inflammation in the pathogenesis of the disease. It described an overexpression of inflammatory mediators such as cytokines and interleukin 6 (IL-6) in the tear film of the patients with KC [3-6].

The onset of KC is usually at puberty and tends to progress until the third decade of life. The progression varies between the affected individuals and between the two eyes of the same individual [8]. The prevalence of KC varies world-wide depending on the geographic location, diagnostic criteria, and cohort of patients. It ranges from 0.0003% in Russia, to about 2.3% in India [9,10]. The incidence reported by Hofstetter in United States was 0.06% [11]. The risk factors associated with KC are family history, ethnicity, ecological factors, mechanical trauma (e.g. eye rubbing), allergic eye disease, Down syndrome, connective tissue disorders (e.g. marfan syndrome), and Leber's congenital amaurosis [12,13]. Keratoconus reported to be severe and rapidly progressive with an early onset in Asir province (Abha City). The reported incidence was 20 case per 100,000 population which was comparable to the reported incidence in some Asian population but much higher than the reported incidence among white population 1 - 2 per 100,000 population in UK and USA [14].

### Aim of the Study

Our study aims to assess the level of awareness among non-medical students towards keratoconus, Abha Saudi Arabia.

### Materials and Methods

A cross-sectional study was conducted among the non-medical students from January 2019 and May 2019 in the Southern region of Saudi Arabia. The students belonged to the following courses: computer science, business, engineering, humanities, languages and translation and arts. The sample size was calculated by using Raosoft software with a Cronbach's alpha value of 0.82 and margin of error 5%. Based on the inclusion and exclusion criteria, 393 non-medical students were included and the questionnaires were circulated using the university official electronic mails.

### Statistical analysis

All the responses were collected and coded. The data was then tabulated and analysed by IBM SPSS version 22 software. Non-parametric Chi-square test was used to analyse the data. A p-value of less than 0.05 was considered statistically significant.

### Results

Among 393 non-medical students who participated in the study, majority (n = 374) were females and (n = 19) were males. The mean age was  $20.92 \pm 2.07$  years.

Majority 226 (57.5%) of the study participants never heard about Keratoconus furthermore, only 32 (8.1%) got to know about keratoconus through their doctor.

Total of 238 (60.6%) they don't know what is keratoconus. Only, 95 (24.2%) answered that it was thinning of cornea, and only 132 (33.6%) knew that keratoconus leads to myopia and astigmatism. Majority 355 (90.3%) denied the relationship between keratoconus and allergic eye disease. Only 84 (21.4%) believe that keratoconus has a hereditary background. 347 (88.3%) of the study participant they don't know how keratoconus treated (Table 1). There were no statistically significant differences between males and females (Table 2). Younger age was significantly associated with poor awareness and knowledge about keratoconus (Table 3).

Among those who had poor awareness and knowledge, majority were females (95.7%) and belonged to age group of 17 - 21 years (68.3%). Similar pattern was seen in study participants with fair awareness. However, 57.1% of the study participants with good awareness belonged to age group of 22 - 26 years (Table 4).

### Discussion

Visual impairment is a common clinical condition that affects children and teenagers in the second decade of life. Keratoconus is the most serious corneal ectatic disease that causes progressive visual deterioration. The prevalence, onset and severity of Keratoconus

Questions	Answers	Responses	
		n	Percentage (%)
Have you ever heard about keratoconus?	Yes	167	42.5
	No	226	57.5
How do you know about keratoconus?	I do not know	223	56.7
	Friends and relatives	73	18.6
	Social media	65	16.5
	The doctor	32	8.1
What is keratoconus?	I do not know	238	60.6
	Thinning of cornea	95	24.2
	Immunological diseases	8	2.0
	Corneal inflammation	17	4.3
	Increase thickness of cornea	35	8.9
Does it lead to myopia?	I don't know	250	63.6
	Yes	132	33.6
	No	11	2.8
Is it related to allergy?	I don't know	289	73.5
	Yes	38	9.7
	No	66	16.8
Is it hereditary?	I don't know	254	64.6
	Yes	84	21.4
	No	55	14.0
How to treat it?	I don't know	203	51.7
	Eye drops	144	36.6
	Glasses	12	3.1
	Contact lens	17	4.3
	Surgery	17	4.3

**Table 1:** Response of the study participants regarding keratoconus. Data was presented as n (%).

Questions	Males n (%)	Gender		Chi square	p value
		Females n (%)			
Have you ever heard about keratoconus?	No	10 (52.6)	157 (42.0)	0.840	0.47
	Yes	9 (47.4)	217 (58)		
How do you know about keratoconus?	I do not know	9 (47.4)	214 (57.2)	2.703	0.44
	Friends and relatives	6 (31.6)	67 (17.9)		
	Social media	2 (10.5)	63 (16.8)		
	The doctor	2 (10.5)	30 (8.0)		
What is keratoconus?	I do not know	10 (52.6)	238 (60.6)	8.238	0.08
	Thinning of cornea	5 (26.3)	90 (24.1)		
	Immunological diseases	2 (10.5)	6 (1.6)		
	Corneal inflammation	0 (0.0)	17 (4.5)		
	Increase thickness of cornea	2 (10.5)	33 (8.8)		
Does it lead to myopia?	I don't know	12 (63.2)	238 (63.6)	0.622	0.73
	Yes	7 (36.8)	125 (33.4)		
	No	0 (0.0)	11 (2.9)		
Is it related to allergy?	I don't know	14 (73.7)	275 (73.5)	1.240	0.53
	Yes	3 (15.8)	35 (9.4)		
	No	2 (10.5)	64 (17.1)		
Is it hereditary?	I don't know	14 (73.7)	240 (64.2)	1.342	0.51
	Yes	4 (21.1)	80 (21.4)		
	No	1 (5.3)	54 (14.4)		
How to treat it?	I don't know	0 (0.0)	203 (54.3)	37.187	0.00*
	Eye drops	11 (57.9)	133 (35.6)		
	Glasses	1 (5.3)	11 (2.9)		
	Contact lens	5 (26.3)	12 (3.2)		
	Surgery	2 (10.5)	15 (4.0)		

**Table 2:** Response of the study subjects regarding keratoconus gender wise. Chi-square test was used to compare between the groups. A p-value of less than 0.05 was considered statistically significant.

\*Statistically significant,  $p < 0.05$ .

Questions 17 - 21 years n (%)	Age group			Chi square	p value	
	22 - 26 years n (%)	27 - 31 years n (%)				
Have you ever heard about keratoconus?	No	94 (36.9)	70 (53.0)	3 (50.0)	9.444	0.00*
	Yes	9 (47.4)	217 (58)	3 (50.0)		
How do you know about keratoconus?	I do not know	156 (61.2)	64 (48.5)	3 (50.0)	9.373	0.15
	Friends and relatives	43 (16.9)	28 (21.2)	2 (33.3)		
	Social media	34 (13.3)	30 (22.7)	1 (16.7)		
	The doctor	22 (8.6)	10 (7.6)	0 (0.0)		
What is keratoconus?	I do not know	171 (67.1)	64 (48.5)	3 (50.0)	25.200	0.00*
	Thinning of cornea	51 (20.0)	43 (32.6)	1 (16.7)		
	Immunological diseases	2 (0.8)	5 (3.8)	1 (16.7)		
	Corneal inflammation	13 (5.1)	4 (3.0)	0 (0.0)		
	Increase thickness of cornea	18 (7.1)	16 (12.1)	1 (16.7)		
Does it lead to myopia?	I don't know	173 (67.8)	74 (56.1)	3 (50.0)	8.925	0.06
	Yes	73 (28.6)	56 (42.4)	3 (50.0)		
	No	9 (3.5)	2 (1.5)	0 (0.0)		
Is it related to allergy?	I don't know	191 (74.9)	94 (71.2)	4 (66.7)	3.652	0.45
	Yes	27 (10.6)	10 (7.6)	1 (16.7)		
	No	37 (14.5)	28 (21.2)	1 (16.7)		
Is it hereditary?	I don't know	169 (66.3)	8 (61.4)	4 (66.7)	2.223	0.69
	Yes	52 (20.4)	30 (22.7)	2 (33.3)		
	No	34 (13.3)	21 (15.9)	0 (0.0)		
How to treat it?	I don't know	151 (59.2)	49 (37.1)	3 (50.0)	29.759	0.00*
	Eye drops	83 (32.5)	59 (44.7)	2 (33.3)		
	Glasses	8 (3.1)	4 (3.0)	0 (0.0)		
	Contact lens	9 (3.5)	7 (5.3)	1 (16.7)		
	Surgery	4 (1.6)	13 (9.8)	0 (0.0)		

**Table 3:** Response of the study subjects regarding keratoconus age wise. Chi-square test was used to compare between the groups. A p-value of less than 0.05 was considered statistically significant. \*Statistically significant,  $p < 0.05$ .

Poor awareness	Awareness			Chi square	p value	
	Fair awareness	Good awareness				
Age group (years)	17 - 21	190 (68.3)	59 (58.4)	6 (42.9)	7.992	0.09
	22 - 26	85 (30.6)	39 (38.6)	8 (57.1)		
	27 - 31	3 (1.1)	3 (3.0)	0 (0.0)		
Gender	Males	12 (4.3)	5 (5.0)	2 (14.3)	2.883	0.23
	Females	266 (95.7)	96 (95.0)	12 (85.7)		

**Table 4:** Level of awareness regarding keratoconus. Chi-square test was used to compare between the groups. A p-value of less than 0.05 was considered statistically significant. \*Statistically significant,  $p < 0.05$ .

are variable from country to another and within the same country as it was reported in Saudi Arabia. The pattern of Keratoconus in the southern region of Saudi Arabia is characterized by early onset, rapidly progressive and more severe form that mandate a risk-based screening program to reduce the burden of advanced Keratoconus [14].

Clinically, young patients usually present with poor distant vision, frequently changing eyeglass prescription and un-correctable visual acuity to 20/20. In advanced KC usually patients have very poor vision with considerable impact on the patient vision-related quality of life (VRQoL) that mandate keratoplasty to rehabilitate their vision. The expected lifetime cost of surgical treatment of keratoconus keep a significant cost to the health system [15,16]. Younger age of onset, steeper cornea, vernal keratoconjunctivitis and history of eye rubbing are risk factors that increase the affected subject likelihood demand for keratoplasty [17].

Worldwide, the level of awareness about the disease condition and the available modalities of treatment would improve the prognosis and reduce the economic burden and disability of affected individuals. Researchers noticed a trend of underuse of the health care system in the developed countries as well as Saudi Arabia [18,19].

Our study showed a significant awareness gap among the highly susceptible population members to KC. More than half of the study group have poor awareness and knowledge about the incidence, symptoms, and treatment modalities of KC. It showed the huge gap in health education programs and the underutilization of the available resources to promote a directed educational material. Awareness and knowledge would enable both clinicians and affected individuals to secure timely decisions regarding the management of keratoconus.

### Conclusion

Visual impairment is a common condition among young population. Onset and severity of keratoconus is diverse among countries. Early screening for the population at risk could hasten the appropriate medical intervention and reduce the burden of this condition. Level of awareness considered as a key factor for a better utilization of the eye health care.

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