Level of awareness among non-medical students toward keratoconus, Abha, Saudi Arabia

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Background: Keratoconus (KC) is a progressive, bilateral, asymmetric, ectatic disease that leads to progressive corneal thinning and protrusion, which results in progressive visual impairment and irregular astigmatism. Early detection plays a critical role in the management and prognosis. Awareness of the population at risk improves early screening and utilization of eye health care. The aim of the present study is to assess the awareness level among non-medical students toward KC, Abha city, Saudi Arabia.

Materials and Methods: A cross-sectional study was conducted among the nonmedical students from January 2019 to May 2019 in the Southern Region of Saudi Arabia. A total of 393 nonmedical students were randomly selected through the university admission deanship records. Electronic consents were obtained from all participants. 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 female (95.7%) and belonged to the age group of 17–21 years (68.3%). Similar pattern was seen in the study participants with fair awareness. However, 57.1% of the study participants with good awareness belonged to the age group of 22–26 years.

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

Key words: Awareness, keratoconus, nonmedical students, Saudi Arabia

INTRODUCTION

Keratoconus (KC) is a progressive, bilateral disease that is characterized by corneal thinning and protrusion which causes irregular astigmatism and visual impairment.[1] The term KC was derived from the Greek words kerato-idis (cornea) and konos (cone). John Nottingham was the first author to describe KC in 1854.[2] Formerly, KC was classified as a noninflammatory 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 in the tear film of the patients with KC.[3-7]

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 worldwide depending on the geographic location, diagnostic criteria, and a cohort of patients. It ranges from 0.0003% in Russia to about 2.3% in...
India.\textsuperscript{9,10} The incidence reported by Hofstetter in the United States was 0.06%\textsuperscript{11}. The reported 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.\textsuperscript{12,13} KC reported to be severe and rapidly progressive with an early onset in Asir province (Abha City). The reported incidence was 20 cases per 100,000 population.\textsuperscript{14} Recently, in a cross-sectional, multicenter study, the prevalence of KC reported to be 4.79% among Saudi pediatric patients (6–21 years).\textsuperscript{15} Early detection, accurate diagnosis using the corneal topography technology, and timely intervention play a critical role in the control of severe visual impairment as a late complication of KC. A screening program for the high-risk group in a highly prevalent area has its great benefits in the public health planning. Awareness of the population at risk potentially contributes to a better community absorption of the educational programs and eventually a proper utilization of the available health-care facilities.\textsuperscript{16,17}

Our study aims to assess the level of awareness among nonmedical students toward KC, Abha, Saudi Arabia.

**MATERIALS AND METHODS**

A cross-sectional study was conducted among the nonmedical students from January 2019 to 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 using Raosoft software (Raosoft Inc., US, 2011) with a Cronbach’s alpha value of 0.82 and margin of error 5%. Inclusion criteria involved nonhealth sciences university students. Health sciences students and students with prior eye diseases were excluded from the study. Based on the inclusion and exclusion criteria, 393 nonmedical students were agreed electronically to participate and included in the study. The questionnaires were circulated using the university official electronic mails.

**Statistical analysis**

All the responses were collected and coded. The data were then tabulated and analyzed by IBM SPSS Statistics version 22.0 (IBM SPSS, V 22.0, 2015, Armonk, New York, United State of America) software. Nonparametric Chi-square test was used to analyze the data. \( P < 0.05 \) was considered statistically significant.

**RESULTS**

Among 393 nonmedical students who participated in the study, 374 students were females and 19 were males. The mean age was 20.92 ± 2.07 years.

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

A total of 238 (60.6%) students did not know what is KC. Only 95 (24.2%) answered that it was thinning of cornea and only 132 (33.6%) knew that KC leads to myopia and astigmatism. Majority 355 (90.3%) denied the relationship between keratoconus and allergic eye disease. Only 84 (21.4%) believe that KC has a hereditary background. 347 (88.3%) of the study participant did not know how KC 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 KC [Table 3].

Among those who had poor awareness and knowledge, majority were female (95.7%) and belonged to the age group of 17–21 years (68.3%). A similar pattern was seen in the study participants with fair awareness. However, 57.1% of the study participants with good awareness belonged to the 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. KC is the most serious corneal ectatic disease that causes progressive visual deterioration. The prevalence, onset, and severity of

| Table 1: Response of the study participants regarding the keratoconus |
|----------------------------------------------------------|
| **Questions** | **Answers** | **Responses, \( n \) (%)** |
|----------------|-------------|------------------------------|
| Have you ever heard about KC? | Yes | 167 (42.5) |
| | No | 226 (57.5) |
| How do you know about KC? | 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 KC? | 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 (9.9) |
| Does it lead to myopia? | I do not know | 250 (63.6) |
| | Yes | 132 (33.6) |
| | No | 11 (2.8) |
| Is it related to allergy? | I do not know | 289 (73.5) |
| | Yes | 38 (9.7) |
| | No | 66 (16.8) |
| Is it hereditary? | I do not know | 254 (64.6) |
| | Yes | 84 (21.4) |
| | No | 55 (14.0) |
| How to treat it? | I do not know | 203 (51.7) |
| | Eye drops | 144 (36.6) |
| | Glasses | 12 (3.1) |
| | Contact lens | 17 (4.3) |
| | Surgery | 17 (4.3) |

KC: Keratoconus, \( n \): Number of responses
KC are variable from country to another and within the same country as it was reported in Saudi Arabia. The pattern of KC in the Southern Region of Saudi Arabia is characterized by early onset, rapidly progressive, and more severe form that mandates a risk-based screening program to reduce the burden of advanced KC.[14‑19]

Clinically, young patients usually present with poor distant vision, frequently changing eyeglass prescription and/or un‑correctable visual acuity to 20/20. In advanced KC, usually, patients have a very poor vision with considerable impact on the patient vision‑related quality of life that sometimes required keratoplasty to rehabilitate their vision. The expected lifetime cost of surgical treatment of KC keeps a significant cost to the health system.[20,21] 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.[21]

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.[21,22]

Our study showed that two‑third of the participants did not know what is KC and only one‑third knew that KC may lead to astigmatism. Majority of them (90%) have poor awareness about the risk factors and the available treatment options for KC. Similar findings were reported in the urban community in Saudi Arabia with significantly poor knowledge about specific eye diseases.[23] Young age and female gender were significantly associated with poor awareness in our study cohort. Similar findings were reported among Hail University students.[24,25] Findings from developed countries showed a notable awareness and knowledge gaps among the general population.[26‑28]

Our study showed a significant awareness gap among the highly susceptible population members to KC. More than half of the study participants 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 KC.

Our study sample has a limitation in the sample size and demographics of the participants that mandates carefulness during the interpretation of the results.

Table 2: Response of the study participants regarding keratoconus gender wise

| Questions                  | Answers          | Gender | χ² | P     |
|----------------------------|------------------|--------|----|-------|
|                            | Males, n (%)     | Females, n (%)  |    |       |
| Have you ever heard about KC? | No               | 10 (52.6) | 157 (42.0) | 0.840 | 0.47 |
|                            | Yes              | 9 (47.4)  | 217 (58)   |       |      |
| How do you know about KC?  | 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 KC?                | 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 do not 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 do not 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 do not 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 do not 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)   |       |      |

*Statistically significant, P<0.05. KC: Keratoconus
CONCLUSION

Visual impairment is a common condition among young population. Onset and severity of KC are 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 eye health care.

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