

Prevalence of Keratoconus in Patients in an Ophthalmology Practice Center in Medellín, Colombia

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ABSTRACT

Aim: To study the prevalence of keratoconus in an ophthalmology practice center in Medellín, Colombia.

Materials and methods: A retrospective cross-sectional study was conducted at the CES clinic. A sample of 274 patients evaluated between 2017 and 2019 was used. Their clinical history was reviewed in search of the diagnosis of keratoconus, demographic variables, and others such as allergic conjunctivitis, atopy, and eye rubbing. A bivariate analysis was performed between the characteristics of the patients and keratoconus using the Chi-square and student's *t*-tests.

Results: The prevalence of keratoconus was found to be 2.6% in the studied population, affecting 85.7% of women and 14.3% of men (*p* 0.097). The mean age of the population with keratoconus was 37.6 ± 7.9 . The prevalence of atopy (37.5%) and allergic conjunctivitis (71.4%) was higher in patients with keratoconus (*p* <0.05).

Conclusion: The prevalence of keratoconus presents an important variability according to the geographical area of residence of the population studied; the one found in this study is similar to that reported in centers in other areas of Colombia and Latin America. More studies are required to obtain epidemiological data comparable with the population prevalence of the rest of the world.

Keywords: Allergic conjunctivitis, Corneal ectasia, Eye rubbing, Keratoconus, Prevalence.

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INTRODUCTION

Keratoconus is a pathology that leads progressively to a decrease in visual acuity due to the thinning and irregularity of the cornea, which is one of the characteristics of corneal ectasia.¹ The thinning is usually bilateral, temporal, inferior and asymmetric.^{2,3} It is chronic and affects mainly young individuals between the second and third decade of life.⁴ Genetic, geographic, ethnic, and family history have been proposed to be associated with the development of the pathology.⁵

There is great variability in the prevalence of keratoconus,^{5,6} the lowest being that in North America and the Netherlands^{1,2} and the highest, that in the Middle East (Arabia, Iran).^{7,8} In the Latin American population, there is a scarcity of epidemiological reports regarding keratoconus, and the few existing reports describe a prevalence of this pathology greater than that in the United States and lower than in the Middle East.^{9,10} There are previous reports in cities such as Bogotá that, due to their characteristics, should have a similar trend and behavior as those in Medellín.¹⁰

The CES clinic is a primary care center in ophthalmology for a population of approximately 46,000 patients. Knowing the prevalence of keratoconus in the population of the CES clinic, its risk factors are important, given that early intervention in these patients translates into a better visual prognosis and a lower cost of treatment per patient. In turn allows to know an approximate of the city prevalence.

This study aims to establish a clear prevalence of keratoconus treated at the institutional level and associated clinical variables.

AIM

To study the prevalence of keratoconus in the ophthalmology service population of the CES clinic in Medellín and find associated factors.

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MATERIALS AND METHODS

Design

A cross-sectional study was carried out using data from medical records of the ophthalmology service of the CES clinic between the years 2017 and 2019.

The study was submitted to the ethics committee of the CES University, being approved by the institution Ethics Committee for Research in Human Beings. In addition, the guidelines of the STROBE (The Strengthening the Reporting of Observational Studies in Epidemiology) guide for cross-sectional studies were followed.

Participants

A probability sampling was carried out with the population that assisted to the CES clinic during the years 2017–2019 (46,000 patients), and a sample was calculated based on the highest prevalence reported in the literature (3.3%),⁷ a precision of 80% and an error of 5 using Epidat 3.1. The sample consisted of 274 patients. Their medical records were randomly chosen and reviewed by the same investigator (SN).

Patients older than 18 years with a diagnosis of keratoconus were included. The diagnosis was established based on corneal

tomography criteria (Pentacam HR): corneal thinning of noninflammatory characteristics, abnormal posterior elevation, abnormal distribution of corneal thickness, asymmetry in corneal power, loss of orthogonality of the astigmatism, vertical displacement of the thinnest corneal point, positive indexes in the Belin Ambrosio display for corneal ectasia, altered art max.

Patients who did not have complete data in the medical record were excluded.

Variables and Sources of Information

An Excel database was completed with data that included the following variables: Age, Sex, Keratoconus, Eye Scratching, Atopy, and Allergic Conjunctivitis.

Statistical Analysis

The statistical analysis was carried out in the SPSS program for iOS version 20.0.

Categorical variables were handled with percentages and absolute numbers and quantitative variables in means and standard deviation. In addition, a bivariate analysis was performed between the characteristics of the patients and keratoconus with the Chi-square and student's *t*-tests. The level of significance was established at 0.05.

RESULTS

The medical records of 274 patients, 119 men (43.4%) and 155 women (56.6%), were evaluated. Of these, seven patients had a diagnosis of keratoconus, for a prevalence of 2.6% (Table 1).

The proportion of keratoconus, by gender, was found to be 85.7% for women and 14.3% for men ($p = 0.097$). The mean age of the population with keratoconus was 37.6 ± 7.9 , and the mean age of the patients without a diagnosis of keratoconus was 47.6 ($p = 0.25$). The prevalence of atopy (37.5%) and allergic conjunctivitis (71.4%) was higher in patients with keratoconus compared to that in patients without it ($p < 0.05$) (Table 2).

DISCUSSION

The epidemiology of keratoconus and, therefore, prevalence data show great variability in the literature. The most recently published worldwide prevalence of keratoconus is of 1.38/1,000 inhabitants,

which was reported in a meta-analysis that included reports from multiple geographic areas.⁵ The institutional prevalence of 2.6% found in the present study is within the ranges reported in different centers around the world, being much higher than the prevalence reported in North America and the Netherlands (54 per 100,000 inhabitants)¹ but lower than that in the Middle East and India (from 3.3% in the general population to 4.5% in children) where the highest prevalence data are found.^{7,8} Regarding populations with greater similarity in geographic location to ours, the findings of this study are like the prevalence of 1.8% in young Mexicans from the School of Medicine and Health Sciences, Monterrey, Mexico, and 2.48% in the adult population from the Barraquer clinic in Bogotá, Colombia.^{9,10}

This important variability could be explained by the influence of the geographic area, genetic factors, and family history of the studied population. Of all these, family history appears to be the main risk factor.⁵ Others causing variability between populations are environmental factors such as exposure to UV light and nutritional factors.^{5,11}

In this study, the distribution of characteristics between both sexes was similar, without presenting any statistically significant difference. Some studies on the prevalence of keratoconus by gender report a higher prevalence in the male gender, probably secondary to the greater exposure of men to environmental factors in working life.¹¹ However, Hashemi et al. found in their recent meta-analysis that there is no significant difference regarding the risk of developing keratoconus between men and women.⁵

The keratoconus group presented a higher prevalence of atopy and allergic conjunctivitis compared to the group that did not have a diagnosis of keratoconus. There is a clear association between allergic conjunctivitis and eye scratching, which shows a relationship with both the development and progression of keratoconus and is widely described in the literature.¹¹⁻¹⁷ Atopy, a systemic condition characterized by asthma, allergy, and/or eczema, is described as a risk factor for the development of keratoconus due to the condition of chronic persistent inflammation; however, the effect of atopy is controversial, and eye scratching, secondary to this condition, seems to be the determining factor for the development of keratoconus.^{5,11,12}

It is important to highlight that the prevalence of keratoconus has increased worldwide. It's due to a clear consensus of more precise and earlier diagnostic criteria^{3,4} and the advent and evolution of diagnostic tools that have allowed the diagnosis of this pathology in subclinical stages.

As it is the first study to evaluate the prevalence of keratoconus in a local practice center, it is of great importance in terms of characterizing our population in order to subsequently establish protocols, guidelines for diagnosis, and early treatment at the institutional level. One of the limitations of this study is its external validity due to the specific of the sample. Therefore, additional population studies should be carried out to achieve greater characterization and extrapolation of epidemiological data and that include variables such as family history and environmental factors.

CONCLUSION

The prevalence of keratoconus presents an important variability according to the geographic area of residence of the population studied; the prevalence found in this study is similar to that reported in clinical practice centers in other areas of Colombia and Latin America. More studies are required to obtain epidemiological data comparable with the population prevalence of the rest of the world.

Table 1: Demographic characteristics

	Number of patients	Percentage
Men	119	43.40%
Women	155	56.60%
Keratoconus	7	2.60%
Eye rubbing	23	8.30%
Atopy	15	5.50%
Allergic conjunctivitis	16	5.90%

Table 2: Distribution of variables according to keratoconus

	No keratoconus (n)	Keratoconus (n)	Valor p
Men	44.2% (118)	14.3% (1)	<0.05
Women	53.8% (149)	85.7% (6)	<0.05
Eye rubbing	8.00% (21)	25.00% (2)	0.14
Atopy	4.60% (12)	37.50% (3)	<0.05
Allergic conjunctivitis	4.20% (11)	71.4% (5)	<0.05

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