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Original research

The prevalence and determinants of pterygium in rural areas

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Abstract

Purpose: To evaluate the prevalence of pterygium and its determinants in the underserved, rural population of Iran.
Methods: In this cross-sectional study of 3851 selected individuals, 86.5% participated in the study, and the prevalence of pterygium was evaluated in 3312 participants. A number of villages were selected from the north and south of Iran using multistage cluster sampling. Pterygium was diagnosed by the ophthalmologist using slit lamp examination.
Results: The mean age of the study participants was 37.3 ± 21.4 years (2–93 years), and 56.3% (n = 1865) of them were women. The prevalence of pterygium was 13.11% (95%CI:11.75–14.47). The prevalence of pterygium was 14.99 (95%CI:12.79–17.19) in men and 12.07 (95%CI:10.3–13.84) in women. Pterygium was not seen in children below the age of 5 years. The prevalence of pterygium increased linearly with age; the lowest and highest prevalence of pterygium was observed in the age group 5–20 years (0.19%) and 61–70 years (28.57%). Evaluation of the relationship between pterygium with age, sex, educational level, and place of living using a multiple model showed that age, living in the south of Iran, and low educational level were correlated with pterygium.
Conclusion: The prevalence of pterygium was significantly higher in Iranian villages when compared with the results of previous studies. This finding may represent the effect of a rural lifestyle and its risk factors.

Keywords: Pterygium; Prevalence; Rural population; Middle east

Introduction

Pterygium results from the abnormal growth of the fibrovascular tissue of the bulbar conjunctiva that is spread over the cornea chronically.[1] In addition to cosmetic problems, pterygium causes disorders like corneal astigmatism and may rarely result in visual impairment through damaging the visual axis, requiring surgery in severe cases.[2] Pterygium is associated with a wide spectrum of factors like sun and UV light, which is the reason why pterygium is more prevalent in tropical regions.[3] Moreover, pterygium is associated with factors like age, sex, ethnicity,[4] and environmental conditions like outdoor occupations.[5] In some cases, pinguecula is the primary form of pterygium, but it does not grow on the cornea.[2] The prevalence of pterygium has been reported from 1.2% to about 40% in different parts of the world.[6,7] The prevalence of pinguecula is higher than the prevalence of

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pterygium, as it is reported in about 70% of the people above the age of 49 years.[8] Many Asian countries are in the "pterygium belt", located between 37° north and south of the equator. Therefore, numerous studies have mentioned pterygium as one of the most common chronic eye diseases in Asia and other countries located in this belt.[9] The prevalence of pterygium has been reported at 9.4% and 1.3% in Shahroud and Tehran, respectively. The difference in the prevalence can be due to age differences in study populations.[10,11] One of the determinants of the prevalence of pterygium is living in rural areas.[12] The prevalence of these two diseases is higher in people residing in villages, which could be due to differences in occupational conditions and the lifestyle of people in urban and rural areas.[13] Studies in rural areas of India and China have shown high prevalence of pterygium, which highlights the importance of the evaluation of these diseases in rural places.[7,13,14] The risk of pterygium is higher in rural areas due to environmental conditions and lifestyle, poverty, and limited access to health services. The present study was conducted to determine the prevalence of pterygium and its determinants in the underserved, rural areas of Iran.

Methods

This cross-sectional study was conducted on underprivileged, rural populations in Iran in 2015. The Ethics Committee of Tehran University of Medical Sciences approved the study protocol, which was conducted in accord with the tenets of the Declaration of Helsinki.

One of the offices of the presidential administration in the Islamic Republic of Iran is dedicated to the development of rural and deprived areas of the country. The sampling frame of the present study was based on the roster of deprived rural villages provided by this office. In this population-based study, the target population was the residents of deprived villages, and it was conducted at rural areas of two underprivileged districts in Iran in 2015.

Study samples were selected through a multistage cluster sampling approach. Using national data, two districts were randomly chosen from the north and southwest of the country. These districts included Shahyoun in the southwest (a district of Dezful County, Khuzestan Province) and Kajour in the north (a district of Noshhar County, Mazandaran Province). Once the districts were determined, a roster of all their villages was prepared, and a number of them were randomly selected.

Given the sample size determined for the study, sampling from each district was proportional to their total population. Therefore, 15 villages were sampled in Shahyoun and 5 in Kajour to maintain the balance because the former district had smaller, less populated villages. In each selected village, all over-one-year old residents were considered the study sample.

Exclusion criteria included a history of pterygium surgery.

An interview was conducted with each participant to collect demographic data including age, gender, history of ocular surgery, education, and occupation. Optometric examinations including automated and subjective refraction and measurement of visual acuity were performed after the interview. Then all participants underwent slit lamp biomicroscopy by an ophthalmologist.

A diagnosis of pterygium was made by the ophthalmologist using slit lamp biomicroscopy upon visualizing a triangular fibrovascular tissue that was attached to the underlying tissue growing onto the cornea.

Statistical analysis

We describe the prevalence of pterygium in at least one eye; therefore, a person whose right or left eye has a pterygium is considered as a case of pterygium. The percentage pterygium along with 95% confidence intervals (CI) were considered in the design effect. Simple and multiple logistic regression was used to evaluate the relationship of pterygium with the study variables. Binomial distribution was used to calculate the 95% confidence interval when the prevalence was low and the distribution was not normal. Statistical analyses were done using the Statistical Package for the Statistical Package for Social Sciences Version 20.0 (SPSS Inc., Chicago, IL, USA) and STATA V11.0. Changes were considered significant based on a significance level of 5%.

Results

A total of 3851 individuals were selected through sampling, 3314 (86.5%) of whom participated in the study. With the exception of 2 patients who had a positive history of pterygium surgery, the pterygium data of 3312 participants was analyzed. The mean age of the study participants was 37.3 ± 21.4 years (2–93 years), and 56.3% (n = 1865) of them were women.

The prevalence of pterygium by age, sex, place of living, and education is presented in Table 1. The prevalence of pterygium was 13.11% (95%CI:11.75–14.47). According to Table 1, the prevalence of pterygium was higher in men than women, but the difference was not significant ($p = 0.212$). No cases of pterygium were observed in children below the age of 5 years; however, 0.19% of the subjects aged 6–20 years had pterygium. The prevalence of pterygium increased linearly with age until 70 years of age and then declined; 28.57% of the individuals aged 61–70 years and 20.33% of the participants older than 70 years had pterygium. Logistic regression did not show a significant correlation between rural areas and pterygium ($p = 0.457$).

Table 1 shows the prevalence of pterygium by educational level. The highest prevalence of pterygium was observed in illiterate people. The prevalence decreased linearly with an increase in the educational level, and the lowest prevalence was observed in participants with a university education.

A multiple model was used to evaluate the relationship of the prevalence of pterygium with age, sex, place of living, and education. The results are presented in Table 2. Living in the south of Iran, aging, and a high school education versus illiteracy were significantly associated with pterygium in this model. The relationship between male sex and pterygium was borderline significant.

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Table 1
The prevalence of pterygium in underserved, rural villages of Iran by gender, location, age, and educational level.

		n[a]	Pterygium
			% (95%CI)
	Total	3312	13.11 (11.75–14.47)
Gender	Female	1865	12.07 (10.30–13.84)
	Male	1447	14.99 (12.79–17.19)
Location	Southwest	1868	14.27 (12.38–16.17)
	North	1444	12.14 (10.13–14.15)
Age (years)	<=5	132	0
	6–20	772	0.19 (0.11–0.55)
	21–30	447	5.75 (3.17–8.33)
	31–40	493	16.43 (12.53–20.33)
	41–50	523	21.04 (16.86–25.22)
	51–60	457	23.05 (18.44–27.66)
	61–70	229	28.57 (21.59–35.55)
	>70	258	20.33 (14.48–26.18)
Education	Illiterate	1105	20.13 (17.30–22.95)
	Primary school	981	13.08 (10.56–15.6)
	Guidance School	354	9.68 (6.00–13.36)
	High school	624	6.62 (4.29–8.95)
	College	248	6.32 (2.70–9.94)

CI: confidence interval.
[a] Number of participants was analyzed.

Discussion

In this study, we evaluated the prevalence of pterygium in the underserved, rural areas of Iran.

The prevalence of pterygium was 13.34% in our study. Table 3 provides an overview of the studies on the prevalence of pterygium. Since the prevalence of pterygium is different based on the age and sex groups and the study population, it is difficult to compare these studies. However, the prevalence of pterygium in our study was similar to its prevalence in countries like China, Singapore, Nepal, Malaysia, India, Indonesia, and Japan, all of which are located in the so-called "pterygium belt". The prevalence of pterygium in our study was higher than its prevalence in rural areas of China and India and also higher than its prevalence in Tehran and Shahroud as urban areas.

Pterygium is an ocular disease that is very much associated with the environment, occupation,[3] climate,[37] dust, and lifestyle,[5] all of which may contribute to its higher prevalence in the rural population.[29]

In this study, the prevalence of pterygium was higher in the southern, rural areas that are closer to the equator as compared to the rural areas in the north of Iran, but the difference was not significant. As mentioned earlier, pterygium is considered an environmental problem, and its prevalence is affected by climatic factors. There is marked difference in climatic factors between rural areas in the north and south of Iran. The climate is hot and wet in the north and arid in the south of Iran. In addition, sunlight exposure is a major factor in rural areas which should be considered.

In our study, the prevalence of pterygium was higher in men than women. Different studies have confirmed this finding.[8,14] One of the reasons could be more outdoor activities of men and their occupational conditions. In general, men more often do jobs like welding, farming, ranching, and fishing than women, which is associated with higher prevalence of pterygium.[9,38,39] However, some studies have reported different results.[17] For example, a study by Peng et al in Tibet showed that women were at a higher risk than men, which seems to be associated with their lifestyle. In Tibet, women are more often involved in outdoor activities and jobs.[28] Nemesure et al found no relationship between pterygium and sex.[40] These differences in the reported results could be due to behavioral, occupational, and follow-up differences between men and women.

In our study, the prevalence of pterygium increased with age. This finding has been confirmed in different studies.[9,17,19] With an increase in age, in addition to ocular physiologic

Table 2
The association between pterygium with some factors by multiple regressions logistic.

		OR (95%CI)	p-value
City	(southwest/north)	0.67 (0.52–0.88)	0.004
Age	years	1.04 (1.03–1.04)	<0.001
Sex	male/female	1.28 (0.99–1.66)	0.055
Education	Illiterate	1	
	Primary school	1.01 (0.73–1.41)	0.932
	Guidance School	0.91 (0.55–1.51)	0.712
	High school	0.62 (0.39–0.99)	0.045
	College	0.57 (0.30–1.10)	0.091

OR: odds ratio.
CI: confidence interval.

Table 3
Summary of other worldwide studies concerning pterygium.

Country	Age	Pterygium (%)
Spain[15]	>40	5.9
China[16]	>30	11.95
Saudi Arabia[17]	17–82	0.074
Singapore[18]	>40	10.1
India[13]	>40	9.5
Singapore[19]	40–79	12.3
Tunisia[20]	Not available	2.4
Australia[21]	Not available	19.6
Iran[11]	Not available	1.3
Indonesia[22]	>21	10.0
China (rural)[23]	>50	10.53
Australia[24]	>20	9.3
China (rural)[25]	>50	6.4
China (rural)[26]	55–85	3.76
China[27]	>40	17.9
China[28]	>40	14.49
China[29]	>40	2.9
Nepal[30]	>16	10.08
India[31]	>30	11.7
Australia[14]	>40	1.2
India[32]	>30	8.47
Blue mountain[8]	>49	7.3
Iran[10]	40–64	9.4
Japan[9]	>40	13.1
China (rural)[33]	>30	6.0
Japan[34]	40–74	4.4
China (rural)[7]	≥50	39.0
Greenland[35]	Not available	8.6
Denmark[35]	Not available	0.7
China (rural)[6]	18–94	1.2
Global world (meta-analysis)[36]	Not available	10.2

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changes like dryness that affects the prevalence of pterygium, the years of outdoor activity increase as well.[14,41] On the other hand, although different cross-sectional studies have reported a relationship between aging and the prevalence of pterygium, a 10-year study did not find any association between age and the incidence of pterygium.[28] Nemesure et al also evaluated the 9-year incidence of pterygium and reported that it was not associated with age.[27] It seems that the positive relationship between age and increased prevalence is affected by the cumulative incidence effect in different ages. This increased prevalence in the adult population should be considered in health plans. Simple measures like the use of sunglasses or brimmed hats to protect the eyes from direct sunlight are inexpensive methods to prevent or lower their incidence and relapse. On the other hand, due to the effect of pterygium on visual axes and its relationship with astigmatism, attention should be paid to its high prevalence in our study, and plans should be designed for its prevention, diagnosis, and treatment on a national level, considering factors like sensitive age groups like adults, men, and those with outdoor occupations. Educational programs and examination of the individuals with high risk occupations can lower the prevalence of pterygium as well.

A relationship was found between the educational level and pterygium in this study. Its prevalence was the highest in illiterate participants and decreased with an increase in the educational level. This finding is similar to previous studies[3,10] and can be related to differences in occupational conditions and lifestyles between educated and uneducated or low educated people. Low educated people mostly undertake manual jobs in outdoor conditions while educated people, in addition to spending many years of their lives studying, mostly have indoor jobs with less exposure to sunlight.

The present study had some strengths and weaknesses. The strengths of this study are its large sample size and its report of pterygium in rural areas of Iran. The weaknesses of this study include the low number of villages, limiting the villages to 2 geographical locations of Iran thereby decreasing its generalizability, and non-determination of the grade of pterygium and its effect on vision. Moreover, the size and location of the lesion was not evaluated by an image reading center.

In conclusion, this study shows that the prevalence of pterygium was significantly higher in the sampled Iranian villages when compared with the results of previous studies. This finding may represent the effect of a rural lifestyle and its risk factors.

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