

Prevalence of pterygium in Iran: a systematic review and meta-analysis study

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Abstract

Background and aim: Pterygium is one of the most prevalent pathologies involving the cornea, which can lead to various vision signs and even reduction in eyesight. No accurate estimate has been reported about the prevalence of pterygium in Iran. Hence, this study aimed to determine the pterygium prevalence in Iran by meta-analysis method.

Methods: Searching for data of the last eleven years (from 2004 to 2015) was conducted using the keywords of pterygium, eye, and Iran in International and domestic indexing services and databases including Iranmedex, Scientific Information Database (SID), Magiran, Irandoc, Medlib, IranPsych, Science Direct, Web of Science (Thomson Reuters), PubMed, and Scopus. The data were analyzed using the meta-analysis method (the random effects model). The disharmony of the studies was investigated using the I² index. The data were analyzed by STATA Ver.11 software.

Results: In 5 studies conducted in Iran, with a sample size of 10,838 people between 2004 and 2015, the extent of the prevalence was estimated to be 11% (95% CI: 3 to 18%). Also, the prevalence of pterygium in women and men was 18% and 13%, respectively.

Conclusion: According to the published reports from Iran and its comparison with other points in the world, the prevalence of pterygium in Iran is high, especially among women.

Keywords: Pterygium, Eye, Prevalence, Iran

1. Introduction

Pterygium is defined as the unusual growth of conjunctiva from the internal corner of the eye to the cornea, so that it transgresses the cornea surface, masking the pupil and blocking the visual axis. Pterygium is one of the prevalent eye illnesses in the world whose diagnosis and treatment dates back to 3 thousand years ago in Greece, the Arabian Peninsula, and China. Even in that period, there was a lot of discussion over its best therapeutic method. We still have the same discussions over the treatment of Pterygium 3 thousand years after that time (1). Pterygium literally means wing which is so called due to the growth of triangular mass from the fibro vascular tissue initiating from the conjunctiva bulbar and moving towards the cornea. It appears like a triangular wing or an arrow point on the cornea which may slowly spread into the patient's visual axis (1, 2). Pterygium, which has the highest rate of abundance in the tropical regions, with 22% prevalence, is more prevalent among those who spend most of their time in market environments due to occupational issues and are exposed to ultraviolet (UV) radiation and dust (3, 4). Pterygium is

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often found inside the palpebral fissure, and occurs on the right-hand side of eye's nasal in 90% of cases. However, it may also be rarely found on the temporal side. In addition, simultaneous bilateral involvement may sometimes occur (2). This type of disease can also weaken eyesight which is attributed to refractive error, and in advanced cases, to the involvement of visual axis. Moreover, it will result in symblepharon in extreme cases. Since the tear film is broken beside the pterygium mass, the tear is not distributed appropriately on the cornea, and gradually causes the formation of holes in the cornea tissue (4). Pterygium is divided into three categories based on the size of the UOZ (uninvolved optical zone): UOZ > 9 mm, UOZ = 7-8.9 mm, and UOZ = 5-6.9 mm group (5). The prevalence of pterygium across the world has been reported to be 0.3 to 37.46 percent. The studies carried out on the population of vast geographic regions indicates the role of environmental factors such as ultraviolet radiation from the sun, climate conditions, and latitude, as well as the age and genetic factors in pterygium pathogenesis (6). Ultraviolet radiation has been mentioned as the most obvious factor in its creation, and improvement and can ultimately result in the emergence of various vision signs including redness, burning, itching, and in advanced cases, vision field limitation and problems concerned with facial appearance (7). Eye redness is one of the most prevalent complaints of patients in ophthalmology centers, and indicates a broad range of eye illnesses from allergic conjunctivitis to vision-threatening diseases. The emergence of pterygium is accompanied by symptoms including redness, burning, itching, and sensing foreign bodies in the eye, causing general concern in most patients. Although eye illnesses demonstrated by eye redness are relatively benign, differentiating serious and dangerous causes from self-limiting cases is necessary and the lack of diagnosis or making therapeutic mistakes can lead to serious visual consequences (8, 9). Numerous studies from various regions of Iran have been carried out to assess the prevalence of pterygium. However, considering the fact that these studies are domestic, no general estimation of the prevalence of pterygium in Iran has been reported. The present study aimed to determine the prevalence of pterygium in Iran by the systematic and meta-analysis reviewing method. This study was firstly designed to systematically review the previous researches and perform the meta-analysis of the final data for evaluating the prevalence of pterygium in Iran.

2. Material and Methods

2.1. Research design

The present study is a meta-analysis to investigate the prevalence of pterygium in Iran. The reviewed documents have been obtained by surfing the net and manual search in the library of Tehran University of Medical Sciences. The studied databases included Iranmedex, SID, Magiran, Irandoc, Medlib, IranPsych, Science Direct, Web of Science (Thomson Reuters), PubMed, and Scopus. The search was restricted to the last 11 years and was updated up to 2015 among dissertations, domestic and foreign scientific journals, the papers presented in conferences, and organizational reports. Since some databases did not respond to the searching operators (NOT, AND, OR), domestic searching was only performed using keywords including pterygium, eye, and Iran in English and Persian languages to achieve the highest response. However, "pterygium", "Eye", and "Iran" were employed for searching through foreign databases. The keywords were standardized in MeSH and finally Iran AND Pterygium were used for searching. In addition, the contents of selected papers were screened to find the related literature.

2.2. Inclusion and exclusion criteria

First, a list of topics and abstracts was prepared, of all searched papers in domestic databases. This was independently carried out by two researchers. Then, the papers with repeated titles were set aside and subsequently, the abstracts were investigated to find suitable literature. In cases of foreign databases, the trend was the same as domestic databases. All searched studies were stored in EndNote x6 software and the remaining steps were done by this software. The criteria of entering the study included: 1) implied prevalence of pterygium, and 2) all studies being descriptive. It should be emphasized that in order to increase the sensitivity of paper selection, the minimum input criteria were used.

2.3. Quality assessment

To access the most relevant and qualified studies, the output criteria were selected as: 1) Irrelevant studies from the standpoint of study design and researched topic, 2) The studies not containing enough information, and 3) Low quality of studies based on the checklist (Strengthening the reporting of observational studies in epidemiology) (10). In order to reduce orientation in the report and error in data collection, two researchers extracted the data from the papers independently and the collection of data was carried out using the standard form. This form was first designed by the research team, and included the following items: author's name, the title of the paper, publication year, journal's name, input and output criteria, and the number of samples.

2.4. Statistical analysis

The prevalence of pterygium in Iran is the main variable of the present study. The variances of each study were calculated using binomial distribution formula and the heterogeneity of studies was investigated by Cochran's test with a significance level below 0.1 and the variation index attributed to heterogeneity (12). All statistical analyses were carried out by STATA Ver.11 software using “metan” commands. The significance level of the tests was set to be $p < 0.05$. The meta-regression analysis was employed to assess the relationship between the prevalence of pterygium in Iran and the number of samples and the research year. Also, the sensitivity test was conducted to investigate the effect of each study on the general result of the research.

3. Results

Based on these steps, 16 papers carried out between 2004 and 2015 were studied in the initial search. Then, the abstracts of 12 papers were investigated. After this step, 7 papers including the primary data were completely studied. Two studies were not used within the analysis process due to lack of access to their full papers. Finally, 5 papers were allowed into the analysis process (Table 1). Figure 1 shows flowchart of the study.

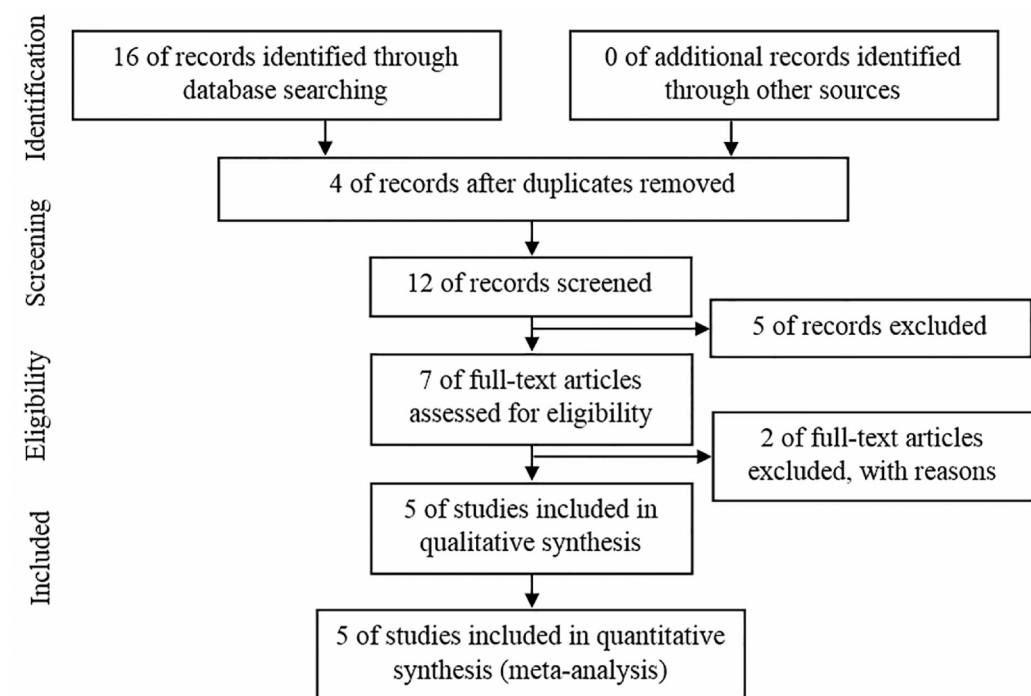


Figure 1. The flowchart of papers input steps for systematic review and meta-analysis

Table 1. The characteristics of the investigated papers about the prevalence of pterygium in Iran.

Reference no.	Year of study	Research location (city)	Prevalence of pterygium	Sample size
3	2004	Hamedan	1.6	184
11	2007	Oroumiyeh	5.6	500
8	2004	Yazd	15	400
12	2012	Shahroud	9.4	5,190
13	2009	Tehran	22.5	4,564

In 5 studies carried out in Iran with the sample size of 10,838 people between 2004 and 2015, the prevalence level of pterygium is 11% (95% CI: 3 to 18). Considering the lack of coordination in studies, the confidence interval for each study and all studies is presented in Figure 2 based on the random effects model. In the present study, the lowest and highest rate of pterygium prevalence in Iran were found in in the study performed by Sadeghian et al. in 2004 (prevalence of 2%) and that of Fotuhi et al. in 2009 (prevalence of 22%), respectively. Also, the prevalence of pterygium in women and men was 18% and 13%, respectively. The prevalence of pterygium among the studied groups in Iran was shown in the Table 2. The relationship between the prevalence of pterygium and the number of the samples using meta-regression was shown in Figure 3.

Table 2. The prevalence of pterygium among the groups studied in Iran

Subdivisions	Number of studies	Sample size	Prevalence [#] (95% CI)	Highest level* (95% CI)	Lowest level* (95% CI)
Total	5	10837	11 (3-18)	22 (21-24)	2 (0-3)
Women	1	400	18 (12-24)	-	-
Men	1	400	13 (9-17)	-	-

Prevalence of pterygium in the men, women and total, * Highest and lower level of pterygium prevalence

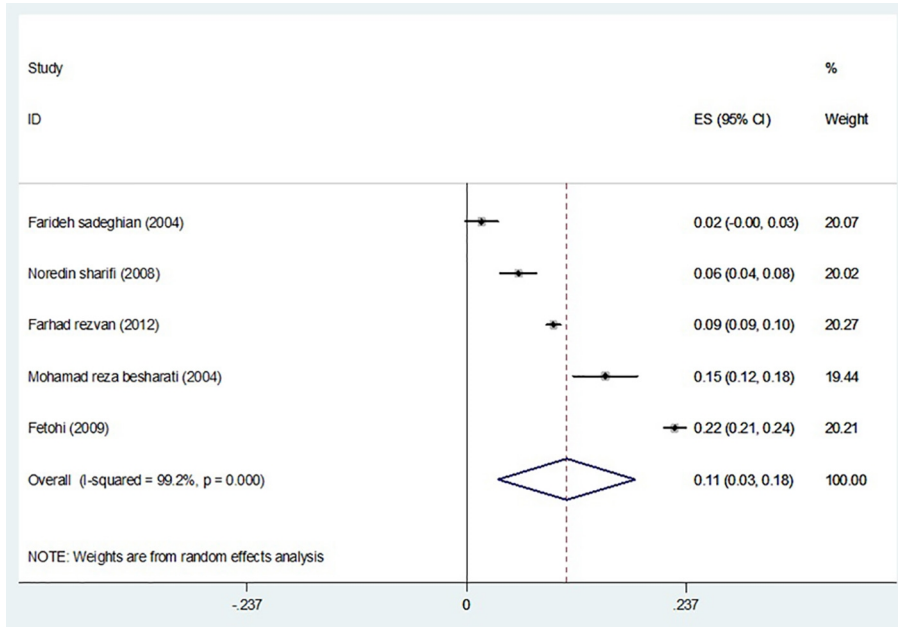


Figure 2. The prevalence of pterygium and its 95% confidence interval in Iran in terms of the author’s name and research year, based on the random effects model. The middle point of each line segment indicates the prevalence of pterygium in each study. The rhombus shape demonstrates the prevalence of pterygium in Iran for all studies.

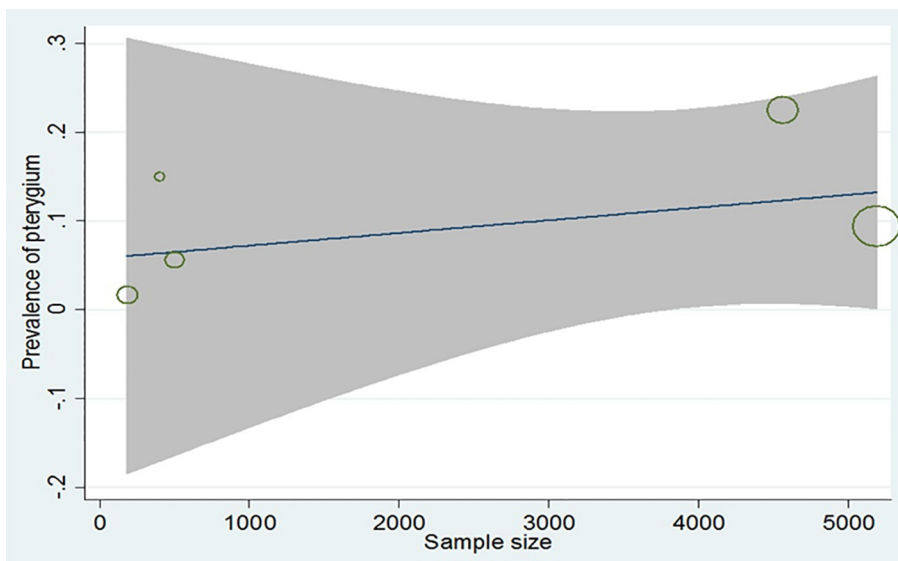


Figure 3. The relationship between the prevalence of pterygium and the number of the samples using meta-regression. (The size of the circle reveals the number of the samples)

The size of the circle reveals the number of the samples in the graph. According to the graph, there is no meaningful relationship between the prevalence level of pterygium in Iran and the number of samples ($p=0.352$), i.e. the increase in the number of samples does not result in higher levels of pterygium prevalence in Iran. Also, there is no

meaningful relationship between the prevalence level of pterygium in Iran and the research year ($p=0.703$). During the period under study in the present research, 2004 to 2015, the prevalence of pterygium in Iran does show a significant rise. Also, the sensitivity test that indicates the effect of omitting each study on the final result of the present study is shown in the Figure 4. According to the graph, omitting Sadeghian's study in 2004 will increase the prevalence level of pterygium in Iran to 13.12% (95% CI: 5.04-21.19). Also, omitting Fotuhi's study in 2009 will decrease the prevalence level of pterygium in Iran to 7.74% (95% CI: 3.25-12.23). These two studies are the most effective ones in the final result of the present study.

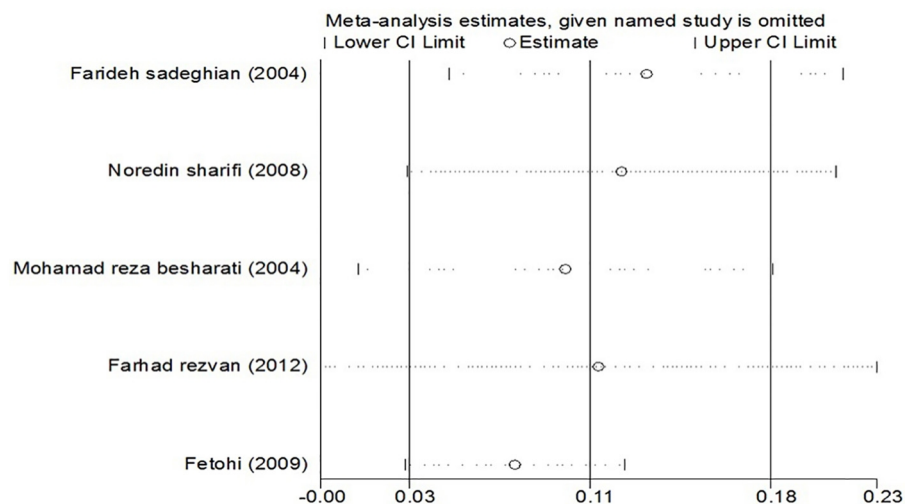


Figure 4. Sensitivity test for evaluating the effect of omitting each study on the final result. (The circles represent the estimation of relative risk (RR) by omitting the study, while the line segments demonstrate the confidence interval of 95% for RR).

4. Discussion

In the 5 studies conducted in Iran, with sample size of 10,838 people between 2004 and 2015, the prevalence level of pterygium was estimated to be 11% (95% CI: 3 to 18). In this study, the lowest and highest prevalence level in women and men was 13% and 18%, respectively. In another study, the prevalence of pterygium in men was higher than that in women. It was also found to be higher among farm laborers and farmers compared with urban residents (2). However, these findings are not in accordance with the results of the present study. In another study, the pterygium disease was reported to be more prevalent in women than in men and pterygium was recognized as the most prevalent cause of eye redness among people over 50 (14). In another study, Sharifi et al. focused on the investigation of the abundance of eye illnesses among 500 patients in ophthalmology centers. The prevalence level of pterygium was reported to be 5.6% (11). Besharati et al. studied the prevalence and causes of eye redness among 400 patients in one of the hospitals in Yazd during two summers and winters. The prevalence of pterygium was found to be 15% in the mentioned study (8). Regarding the results of the previous studies, the present meta-analysis study seems to be necessary to achieve a total estimation of pterygium prevalence in Iran. The World Health Organization (WHO) has recently conducted comprehensive studies in terms of the prevalence of eye disorders in large sample sizes among 40-year-old people. In this research, cataracts have been introduced as the main cause (47.8%) of blindness in the world, while pterygium was mentioned as the most prevalent eye disorder (15). The highest level of pterygium prevalence has been observed at ages over 40 years (3). The prevalence of pterygium has been reported to be between 0.3 to 37.46 percent worldwide (6). As we approach the equator, the prevalence is increased (22%). In the study conducted by Panchapak in Australia on 3,564 patients over 49 years old, pterygium was detected among 7.3% of the studied society (16). In the study conducted by Wuk in China, the prevalence of pterygium in patients with eye redness was 33.01% (14). Thus, the 11% prevalence of pterygium in Iran is considered to be high, and taking hygienic and treatment measures about that is of great value. This study had limitations including lack of access to the full paper of some studies and data deficiencies in a number of researches.

5. Conclusions

According to the results of the study and its comparison with other points in the world, the prevalence of pterygium in Iran is high, especially among women, and more research is suggested for evaluation of pterygium prevalence in

the different parts of Iran. Designing of new studies for detection of risk factors of pterygium in the high prevalence areas is also suggested.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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