

Relationship between pinguecula formation and exposure to tandoor ovens in a hospital-based study

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Abstract

• **AIM:** To investigate the relationship between pinguecula and the use of tandoor ovens.

• **METHODS:** A total of 539 women, ranging in age from 20 to 86y who attended an outpatient clinic were enrolled. All the patients were asked whether they used tandoor ovens. Women exposed to tandoor ovens ($n=286$) were accepted as participants in the study group and they were compared with participants in the control group ($n=253$). The age, presence of pinguecula, duration of exposure to tandoor ovens as years and occupations were recorded for all the subjects.

• **RESULTS:** Mean duration for exposure to tandoor was 20.26y (range 1–62y) in the study group. The rate of pinguecula in the study group was 82.2% (235/286), and the rate in the control group was 37.5% (95/253); this difference was statistically significant ($P<0.05$). Pinguecula was seen in 61.2% (330/539) of all the participants.

• **CONCLUSION:** Pinguecula is strongly associated with exposure to tandoor ovens.

• **KEYWORDS:** pinguecula; tandoor ovens; heat effect

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INTRODUCTION

A tandoor oven is a cylindrical clay oven used to make flat bread (Figure 1) or to cook meat especially in

Azerbaijan, India, Turkey, Iran, Armenia, Pakistan, Uzbekistan, and Afghanistan. The heat for a tandoor oven is traditionally generated by a charcoal or wood fire, burning within the tandoor oven itself, thus exposing the food to live-fire and radiant heat cooking.

Pinguecula is a benign, yellowish to brown, elevated tissue growth found in the interpalpebral fissure adjacent to the limbus but not over the cornea. Pinguecula develop due to an alteration of normal tissue, where stromal collagen is replaced with thicker fibers [1-5]. While pinguecula is considered to be a common eye disorder, the etiology and pathogenesis is still not well known [6]. In some studies, it was concluded that a relationship exists between pinguecula and long term exposure to ultraviolet light, wind, and dust, and advanced age [7-9]. In one study, a correlation was found between an outdoor working environment (welders) and the prevalence of pinguecula [10].

Prevalence rates for pinguecula ranges from 22.5% to 97% [9,11-14]. Pinguecula may sometimes become inflamed, and symptoms like dryness, inflammation and redness can be seen [15-18]. In fact, this study was planned when the physicians received hundreds of complaints about such things as itching, pain and redness from women using tandoor ovens.

We searched the literature about pinguecula to see if any studies had investigated the relationship between this condition and the use of tandoor ovens. Although many data about pinguecula are currently available in the literature, there is no study about the relationship between it and exposure to tandoor ovens. Therefore, we designed this study to investigate whether such a relationship exists.

SUBJECTS AND METHODS

This study was performed at Agri State Hospital in Agri (eastern part of Turkey) that is located in 39 degrees north of the equator. The study was conducted between September 2010 and May 2011. Informed consent was obtained from the subjects.

A total of 539 women ranging in age from 20 to 86y who attended to the outpatient clinic were enrolled. All the patients were asked whether they used a tandoor oven. Women exposed to tandoor ovens ($n=286$) were accepted as participants in the study group and subjects without any ophthalmologic disorders other than refractive problems participated as members of the control group ($n=253$). The age, presence of pinguecula, duration (number of years) of exposure to tandoor ovens and occupations were recorded for all subjects.



Figure 1 Making flat bread in a tandoor oven.

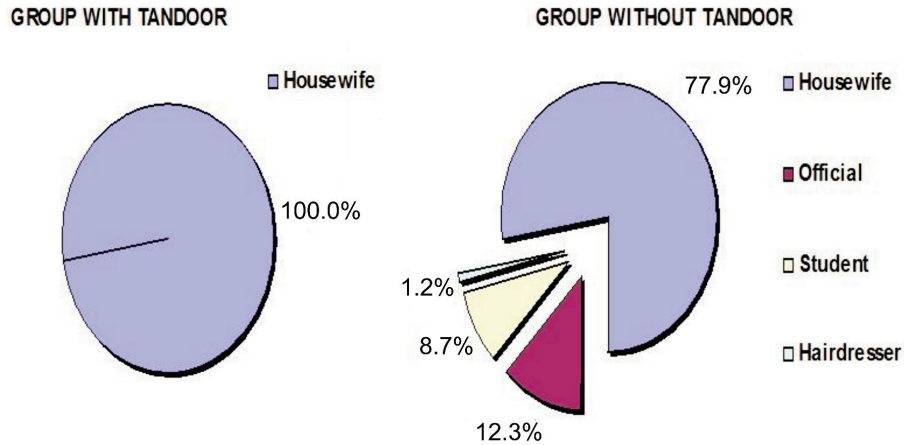


Figure 2 The distribution of the occupations in the groups.

Table 1 Prevalence of pinguecula by age in tandoor and non tandoor groups

Age groups (a)	No.of all subjects	Prevalence of pinguecula (%)		
		With tandoor	Without tandoor	P
20-30	91	25/40 (62.5)	24/51 (47.1)	>0.05
31-40	160	83/94 (88.3)	38/66 (57.6)	<0.05
41-50	123	47/56 (83.9)	18/67 (26.9)	<0.05
>50	165	80/96 (83.3)	15/69 (21.7)	<0.05

Ophthalmologic examination was performed on all the patients by biomicroscopy by a single ophthalmologist who made the diagnosis of pinguecula. The diagnosis of pinguecula was made when the typical yellowish elevated lesion on the nasal or temporal bulbar conjunctiva was present. Laterality of pinguecula was also recorded. Exclusion criteria were as follows: infectious/inflammatory conjunctivitis, history of ocular surgery, entropion, ectropion, and trichiasis

The study was conducted in accordance with the tenets of the Declaration of Helsinki. We used Chi-square and independent samples *t*-tests for statistical analysis.

RESULTS

The mean ages were 44.47y (range 22-86y) in the study group and 42.15y (range 20-75y) in the control group. There was no age difference between the two groups. In all the subjects, the rate of exposure to tandoor ovens was 53.1% (286/539). The mean duration for exposure to tandoor ovens was 20.26y (range 1-62y) in the study group. In the study group, pinguecula was seen at the rate of 82.2% (235/286). In the control group, pinguecula was seen at the rate of 37.5% (95/253) and this difference was statistically significant ($P<0.05$). Pinguecula was seen in 61.2% (330/539) of all the

participants. While the rate of pinguecula in both eyes was 97% in the study group, it was 87.4% in the control group. The duration for exposure to tandoor ovens was significantly correlated with increasing age. The prevalence rates based on the age groups is shown in Table 1.

In the study group, the occupation of all the participants was housewife and none of the women had a job outside the home and none were students. In the control group 77.9% of the women were housewives, 12.3% were government officials, 8.7% were students and 1.2% were hairdressers (Figure 2).

DISCUSSION

Many studies have been performed to investigate the prevalence and correlations between pinguecula and age, climate, and geographic and ethnic variations [15-17,19,20]. In this report, we investigated the relationship between pinguecula and exposure to tandoor ovens.

The mean age in our study was lower than in other studies because we included younger participants (range 20-86y). In different studies the mean age was between 54y and 67y which is higher than our study due to the study design in which the authors accepted participants over the age of 40 [12, 14, 15].

The development of pinguecula is affected by numerous intrinsic and extrinsic factors, including ageing, sun exposure and wind. Sun exposure plays an important role in the development of pinguecula, and reports indicate higher prevalence rates in tropical areas of the world [16,17]. Pinguecula, like pterygium, is one of the common ocular surface disorders seen in south-eastern Turkey [3]. We wanted to imply a factor that has not been studied before, which is that a correlation exists between pinguecula and exposure to tandoor ovens, which is frequent in Anatolian, Middle Eastern and Indian regions.

In this study, the average duration for exposure to tandoor ovens was 20.26y (range 1-62y) in the study group. The duration was significantly correlated with increasing age. This finding might seem very high with respect to the mean age of all the participants. However, it is due to the early age at which women in eastern Turkey get married. Girls get married after they reach the age of 16 especially in rural areas. Therefore, if a girl gets married when she is 20 and starts to cooking and making flat bread for her large family for a woman who is 40, the duration for exposure to tandoor ovens will reach 20y, or more. Consequently, this duration for exposure to tandoor ovens should not be accepted as an exaggerated rate for a 40-years-old woman.

Pinguecula was seen at the rates of 82.2% and 37.5% in the study group and the control group, respectively. The reported prevalence rate in the literature is between 22.5% and 97% [9,11-14]. The results of our study may also be so higher because it is a hospital-based study which is also the limitation of the study. In other studies the prevalence rates were found to be 22.5% in Iran, 69.5% in Australia and 97% in Canada [11-13]. In Turkey, Agri is situated at 43 degrees east longitude and 39 degrees north latitude and the altitude is 1600 m. The climate is generally dry and warm. The temperature ranges between -30°C and 35°C and the annual mean temperature is 8.7°C. The area's seasonal changes, altitude and climate are similar to Iran's. However, our study reports a four fold higher prevalence rate than Iran (82.2% vs 22.5%) due to the fact that our study investigated women who were exposed to tandoor ovens. If we compare our control group, the pinguecula rate is not higher (37.5%) than the rate found in the latter study.

There was a correlation between an outdoor working environment and the prevalence of pinguecula. In one study, pinguecula was present in 57% of the welders, and the area affected by pinguecula tended to be larger with increasing welding exposure [8]. We knew that using a tandoor oven is not the same as working outdoors as a welder, but there are some similarities between the two, such as exposure to heat, light, and dust. Our study points out that use of tandoor ovens increased the prevalence of pinguecula in women exposed to tandoor ovens in the eastern part of Turkey. Therefore, a physician working in the aforementioned countries should keep in mind the effect that exposure to tandoor ovens can have on pinguecula when a woman comes in with a

complaint of pain, itching and redness with her eyes.

This study showed that pinguecula is strongly associated with exposure to tandoor ovens.

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