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Original Article

# Prevalence and severity of pterygium in Somalian male population: Can Khat consumption have a synergistic effect with ultraviolet radiation?

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**Abstract**

**Aim:** To investigate the relationship between khat consumption, UV radiation and pterygium among male population in Somalia.

**Materials and Methods:** Between November 2019 and February 2020, 2,200 patients were examined. 146 patients who met the criteria among 335 patients with primary pterygium were included in the study. Ocular examinations were performed using slit-lamp biomicroscope. Patients were evaluated in terms of outdoor work, age, medical treatment history of pterygium, use of glasses or hats, family history, location of pterygium and eye with pterygium.

**Results:** In this study, 146 patients with pterygium were examined. The cases were divided into two groups as grade 3 (42 patients, 28.8%) and non-grade 3 (104, 71.2%). The mean age of the patients was 43.5 ± 9.7 years. When the demographic findings of grade 3 and non-grade 3 patients were compared, khat use ($p<0.001$) and outdoor work ($p=0.001$) were significantly increased in the grade 3 group. The use of sunglasses and / or hats ($p=0.004$) and medical treatment history ($p=0.042$) were significantly increased in non-grade 3 groups.

**Conclusion:** Khat consumption may increase the likelihood of advanced grade pterygium. Khat and ultraviolet radiation may have synergistic effects on the pterygium grade.

**Keywords:** Pterygium; Khat; Catha Edulis; Somalia; Africa

## INTRODUCTION

Pterygium is a degenerative subepithelial fibrovascular tissue where the bulbar conjunctiva advances from the nasal side, rarely from temporal side to the cornea. Although the growth itself is benign, it may cause decreased visual acuity by encroaching on the visual axis or by inducing astigmatism (1,2). It is a common ophthalmic disease that causes cosmetic anxiety in patients but it's etiology and pathogenesis are not fully understood (3).

Although many theories have been tried to explain the pathogenesis, it is suggested that the disease is multifactorial; low income, old age, education level, dry and dusty weather, living in rural areas and male gender are other risk factors (4). The other risk factors such as tear film changes, cytokines and growth factor imbalances, immunological disorders, genetic mutations and viral infections have also been implicated in the pathogenesis (3). The most important risk factor for pterygium formation is prolonged exposure to ultraviolet radiation (5).

Khat 'Catha Edulis' leaves are consumed at a high rate in the subsaharan region and are known to be addictive psychologically and physiologically (6). The cathinone substance in khat is the β-keto analogue of amphetamine and is chewed in the mouth and absorbed from the buccal mucosa and small intestine (7). Amphetamine-like psychotic effects are observed in long-term khat use (8). In addition, methamphetamine increases the expression of Ki-67 and p53protein at the cellular level (9). It was found that Ki-67 and p53 protein expression was significantly increased in pterygium epithelial cells (10).

In our opinion; the khat substance, which contains cathinone, may be closely related to the development of pterygium, and there are no studies in the literature showing its association with pterygium.

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In this study, we planned to investigate whether there is a relationship between khat consumption and pterygium.

## MATERIALS and METHODS

### Study population

Our study Mogadishu Somalia Turkey Recep Tayyip Erdogan Education and Research Hospital was carried out on patients admitted to the ophthalmology clinic. Between November 2019 and February 2020, 2200 patients were examined.146 patients who met the criteria among 335 patients with primary pterygium were included in the study. Approval was obtained from the institutional ethical review committee. Informed consent was obtained from the patients before any examination or treatment was performed. The study was conducted in accordance with the principles of the Helsinki Declaration. Routine ophthalmologic examinations were performed in all cases. Detailed history was obtained from all patients included in the study. Patients were evaluated in terms of outdoor work, age, medical treatment history of pterygium, use of glasses or hats, family history, location of pterygium and eye with pterygium.

Patients under 20 years of age, those who had previously undergone pterygium or ophthalmic surgery, systemic drug use, or patients with systemic disease were excluded. Previous studies have shown that smoking prevents pterygium (11) because of smoking data were excluded from the study. Female patients could not be included in the study because Somalian women did not use khat.

### Ophthalmological examination

Eye findings were evaluated using an SL-450 slit-lamp biomicroscope (Nidek Co. LTD.Gamagori, Aichi, JAPAN) by an ophthalmologist. Pterygium was defined as a fibrovascular growing lesion extending beyond the temporal or nasal limbus to the cornea.

Grade 1: The location of the lesion extends to the cornea less than 2 mm.

Grade 2: The location of the lesion extends up to 4 mm on the cornea.

Grade 3: The location of the lesion extends tomore than 4 mm on the cornea and visual axis (12).

Because of the number of patients in grade 2 was low (n=15) and similar studies were taken into consideration (13), grade 1 and 2 were considered as the same group and grade 3 as the other group.

Statistical analysis: The Statistical Package for the Social Sciences (SPSS v.23.0,Chicago, USA) was used for the statistical analyses. Descriptive statistics; i.e., mean ± standard deviation (SD) values were used to describe quantitative data and frequencies and percentages for qualitative data. Variables with normal distribution were analyzed by independent sample t-test. Variables without normal distribution were analyzed by Mann-Whitney U-test.

## RESULTS

This study evaluated the data of 146 patients with pterygium. The cases were divided into two groups as grade 3 (42 patients, 28.8%) and non-grade 3 (104, 71.2%).The mean age was 43.5 ± 9.7 years. When the demographic findings of grade 3 and non-grade 3 patients were compared, khat use (p<0.001) and outdoor work (p=0.001) were significantly increased in the grade 3 group. The use of sunglasses and / or hats (p=0.004) and medical treatment history (p=0.042) were significantly increased in non-grade 3 groups.

Age, family history, being over 40 years old, the side of the pterygium (nasal / temporal), and the eye with the pterygium (right / left) were not statistically significant (Table 1).

**Table 1. Comparison of Grade 3 and Non-Grade 3 patient data**

| | Non Grade 3 n=104 | Grade 3 n=42 | P value |
|---|---|---|---|
| **Age (years)** | 40.7±10.9 | 44.3±9.1 | 0.065 |
| **Use of khat, n (%)** | 8 (7.7) | 17 (40.5) | <0.001 |
| **Oudoor twork, n (%)** | 45 (43.3) | 31 (73.8) | 0.001 |
| **Family history, n (%)** | 23 (22.1) | 14 (33.3) | 0.158 |
| Medical treatment history, n (%) | 27 (26) | 4 (9.5) | 0.042 |
| Use of hat and/or sunglasses, n (%) | 37 (35.6) | 5 (11.9) | 0.004 |
| Over 40 years, n (%) | 51 (49) | 28 (66.7) | 0.053 |
| Nasal/Temporal site | 97/7 | 36/6 | 0.147 |
| Right/Left eye | 57/47 | 18/24 | 0.191 |

## DISCUSSION

In our study we investigated the relationship between the high degree of pterygium and khat consumption and we found a few important findings. This is the first study on pterygium in Somalia. Secondly, khat, which is widely consumed, can accelerate the development of advanced pterygium.

Khat consumption has been demonstrated in studies that have an amphetamine-like effect in the body (14). Considering that amphetamine increases p53 (15) and Ki-67 (16) protein expression and increases these proteins in pterygium cells, the significant height of grade 3 pterygium in patients using khat suggests that khat substance acts by increasing expression of these proteins.

There are studies showing that pterygium grade progresses and its frequency increases with increasing age in the literature (17). The Kumejima study conducted in Japan revealed that the incidence of pterygium over the age of 40 was 30.8% and had shown that age increase is a risk factor for pterygium progression (18). In our study; the average age of both grade 3 and non-grade 3 groups was quite young. Therefore, the ages were similar in both groups. The same finding was also observed when the patients were separated under 40 years of age or older. If our patient population was older, the number of grade 3 patients would be higher. Contrary to many other studies, the fact that age and pterygium grade increase were meaningless in our study is supportive of our hypothesis. Otherwise, we would fall into the dilemma of whether the age factor or khat use affects the progression of advanced pterygium. In addition, the similarity of the age groups in our study suggests that the effect of khat consumption on pterygium progression becomes prominent.

It is well known that ultraviolet radiation from the sun causes oxidative damage to DNA and is thought to be an significant factor for pterygium pathogenesis (19). Studies have shown that ultraviolet radiation from the sun causes mutations in the p53 protein in pterygium epithelial cells (20). A study among motorcycle riders in Nigeria states that the use of UV-protected sunglasses and a helmet prevents the development of pterygium (13). The study of the elderly Mongol population in the high altitude Henan region of China also highlights the protective importance of wearing sunglasses and a wide-brimmed hat (21). In our study, we found that the patients who did not use hats and/or sunglasses were advanced patients and statistically significant use of hats and/or sunglasses was consistent with these studies. As a result of these findings, we think that using a large enough hat together with sunglasses to prevent the effects of ultraviolet radiation from the sun, especially in rural areas and in people working outside, may prevent the progression of pterygium.

The area between 37° south and north of the Equator is defined as a pterygium belt, where pterygium is more common (22). High prevalence in a study among people living on the island of Jaloh, just south of the equator, supports this observation (22). Despite this observational finding, there are some exceptions. Although the Solomon Islands are very close to the equator, the prevalence of pterygium among the people was very low (0.3%) (23).

In addition, there are studies showing that the frequency of pterygium increases among people living at high altitudes (24). It is a known fact that as the altitude increases, the harmful effect of ultraviolet rays from the sun increases (24). Maharjan et al. found the frequency of pterygium as 10.08% among people living in high altitude in Nepal (25). A high prevalence of pterygium is reported by Wang et al from Tibet, where the altitude is very high (26). Guo et al reported that the pterygium is a common and highly prevalent eye disease from a high altitude region of Mongolia (27). In contrast, the study of Lu et al. among the Mongolian population living in the Tibetan Plateau in China showed that the prevalence was not statistically significant for participants with pterygium between different altitudes (21).

Somalia is not a high altitude country. However, the relative frequency of pterygium in the country suggested that high altitude may not be a risk factor in pterygium development or progression. Contradictory results in these studies suggest that ultraviolet radiation alone does not accelerate the progression of pterygium. In our study, the high incidence of advanced pterygium in patients using khat, high exposure to sun in the same patient group, suggests that khat and ultraviolet radiation may have additive effects at the cellular level.

In the Limpopo study (28) and in the pterygium prevalence study in North Ethiopia (12), medical treatment history had a positive predictive value in patients with pterygium, but these studies did not assess the effect of drug use on grade. In our study, it was observed that drug use may delay the progression of pterygium to advanced grade. In our study, the lower grade of patients who had previously received medical treatment for pterygium was found to be one of the positive predictors and was statistically significant.

The classification of patients with pterygium alone and no comparison with non-pterygium patients are among the limitations of our study. Another limitation was that women did not consume khat in the Somali population, preventing the inclusion of female patients in the study. The entire study consisted of a male population. The fact that no studies have been conducted between khat consumption and eye diseases limits our access to the findings in this area. Our study is an observational study. Further studies are needed to support the hypothesis that khat consumption may accelerate the grade of the pterygium.

## CONCLUSION

Khat consumption may increase the likelihood of advanced grade pterygium. For this reason, regular eye check-ups for patients who use khat for a long time will be beneficial. It is recommended that these patients be informed that

advanced pterygium can be seen more frequently due to khat use.

*Competing interests: The authors declare that they have no competing interest.*

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*Ethical approval: Approval was obtained from the Somalia Mogadishu - Turkey Recep Tayyip Erdogan Education and Research Hospital ethical review committee.*

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