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Incidence Rate and Clinical Characteristics of Pterygium in *Rumah Sakit Khusus Mata Masyarakat,* South Sumatra Province

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ABSTRACT

Pterygium grows widely in tropical regions. Consequently, Indonesia has a comparatively high incidence rate of pterygium. On the other hand, South Sumatera has the least amount of data collected about the incidence rate and clinical characteristics of pterygium. The purpose of this study was to ascertain the incidence rate and clinical characteristics of pterygium patients in Rumah Sakit Khusus Mata Masyarakat in South Sumatera Province from 2019 to 2022. Descriptive observational methods with retrospective cohort study were employed in this investigation. Using a purposive sampling strategy, the sample consisted of patients with pterygium identified from the medical records. The incidence rate of pterygium among patients of RS Khusus Mata Masyarakat was 0.023 (2.3%) or 23 cases/1000 people per year. The 152 pterygium patients included in this study were mostly female (59.9%), mostly between the ages of 61 and 70 (33.6%), and most of them worked indoors (65.1%). Most patients' visual acuity (VA) was 6/9 (15.8%). The location of pterygium was primarily nasal (87.2%), grade II (32.5%), unilateral lateralization (61.2%), clinical manifestationof foreign body sensation (45.1%), and astigmatism (29%). Pterygium was mainly found in females, 61-70 years old, having an indoor job, 6/9 VA, nasal location, grade II, unilateral lateralization, the clinical manifestation of foreign body, and having less astigmatism.

Keywords: age, clinical characteristics, gender, occupation, pterygium

INTRODUCTION

Pterygium is a fibrovascular overgrowth of subconjunctival tissue, triangular in shape, and extending into the cornea at the palpebral fissure, medially and laterally.[1] Derived from 2

Greek words, the word "pterygium" comes from: 'pteryx' meaning wing and 'pterygion' meaning fin in reference to its characteristic wing-like growth pattern.[2]

Pterygium is present worldwide with prevalence rates depending on age group and geographical location.[3] In tropical areas such as Indonesia, with high exposure to ultraviolet light, the risk of developing pterygium is higher when compared to non-tropical areas. Based on the Riskesdas survey (2013), the prevalence of pterygium in Indonesia was 8.3 percent. The highest prevalence of pterygium was in Bali, at 25.2%. DKI Jakarta Province had the lowest prevalence of pterygium, at 3.7%. While South Sumatra Province, the prevalence of pterygium was 5%.[4]

The development of pterygium is associated with exposure to ultraviolet light. It occurs at the highest prevalence and is most severe in tropical regions near the equator and to a lesser extent in colder climates.[5] Outdoor work and ultraviolet light are implicated in the cause of pterygium. This is supported by data from Riskesdas (2013) where occupations as farmers, fishermen, and laborers had the highest prevalence of pterygium at 15.8%.[4] The use of hats and sunglasses can be done as a protective measure.[1]

Based on research, the incidence and recurrence of pterygium is quite high in Indonesia, because it is in a tropical climate. It is still rare to find data on the incidence rate and clinical characteristics of pterygium in South Sumatera Province, especially in *Rumah Sakit Khusus Mata*

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Masyarakat, which is owned by South Sumatera Province Government. In addition, the results of previous research on pterygium are also still varied.

METHOD

The type of research used is descriptive observational with retrospective cohort study. This research was conducted from September to December 2022. The research was carried out at the medical records installation of *Rumah Sakit Khusus Mata Masyarakat*, South Sumatera Province.

The study population was all patients recorded in the tumor subsection medical record installation. In this study, the sample used was all pterygium patients recorded in the medical records installation for the period June 2019 - June 2022.

All patients who met the inclusion criteria and did not include in the exclusion criteria were used as samples. The inclusion criteria were patients diagnosed with pterygium who received either inpatient or outpatient care at RS Khusus Mata Masyarakat, South Sumatra Province, between June 2019 and June 2022. The exclusion criteria included patients with a history of ocular surgery, as well as those with incomplete, damaged, or illegible medical records. Sampling in this study using purposive sampling technique. The variables sought in this study include sociodemographic characteristics and clinical characteristics. Sociodemographic characteristics are age, gender, and occupation. Clinical characteristics are pterygium location, lateralization, complication, grade, and clinical manifestation. All data obtained were processed using Microsoft Excel 2019 and Statistical Product and Service Solutions (SPSS) 25 application programs and analyzed descriptively.

RESULT

The subjects of this study were inpatients and outpatients from June 2019-June 2022 who were recorded in medical records. The results obtained were 152 people (209 affected eyes) who met the inclusion criteria and did not meet the exclusion criteria. The variables sought in this study include age, gender, occupation, clinical manifestations, lateralization, affected eye, pterygium gradation, pterygium location, complications, and visus of pterygium patients.

$$incident\ rate = \frac{new\ cases}{people\ at\ risk\ x\ timeframe}$$
$$= \frac{152}{2193\ x\ 3}$$
$$= \frac{152}{6579}$$
$$= 0{,}023$$

The incidence rate[2] of pterygium among patients of RS Khusus Mata Masyarakat in the eye tumor subsection was 0.023 (2.3%) or 23 cases/1000 people per year.Sociodemographic characteristics of pterygium patients can be seen in Table 1, including age, gender, and occupation. More pterygium patients were found in the age range 61-70 years as many as 51 people (33.6%). While the least was found in the age range ≥71 years as many as 7 people (4.6%). Most pterygium patients occurred in women as many as 91 people (59.9%) compared to men as many as 61 people (40.1%). While the occupational categories of pterygium patients are mostly indoor as many as 99 people (65.1%) compared to outdoor work as many as 53 people (34.9%)Occupational categories were grouped into indoor and outdoor work. Indoor occupations included homemakers, students, private employees, government employees, and entrepreneurs, whereas outdoor occupations comprised farmers, fishermen, construction workers, laborers, miners, couriers, drivers, police officers, and military personnel.

Table 1. Sociodemographic frequency distribution ofpterygium patients

Sociodemographic Characteristic	Frequency	Percentage
	n	%
Age group		
<40	26	17,1%
40-50	31	20,4%
51-60	37	24,3%
61-70	51	33,6%
≥71	7	4,6%
Gender		
Male	61	59,9%
Female	91	40,1%
Occupation		
Indoor work	99	65,1%
Outdoor work	53	34,9%
Total	152	100%

Clinical characteristics of pterygium patients can be seen in Table 2, including location, lateralization, clinical manifestation, complication, and grade. The results showed that a total of 209 eyes from 152 patients with pterygium were affected.

The most dominant pterygium location was nasal with 193 eyes (92.3%) and the least was nasal et temporal with 6 eyes (2.9%). Nasal involvement was classified based on whether it affected only the right eye, only the left eye, or both eyes. Similarly, temporal involvement was categorized according to involvement in the right eye only, the left eye only, or both eyes. Cases with both nasal and temporal involvement were also classified based on whether the condition affected only the right eye, only the left eye, or both eyes.

The most common lateralization of pterygium was unilateral at 203 eyes (97.1%) and the leastwas bilateral at 6 eyes (2.9%). Unilateral involvement referred to cases affecting only one eye, either the right or the left. In contrast, bilateral involvement referred to cases in which both eyes were affected.

The most common grade was grade II with 68 eyes (32.5%), this number was notmuch different from grade III with 63 eyes (30.1%). For patients with bilateral pterygium, the highest grade observed was recorded in the table; specifically, two patients (1%) had grades II–III and one patient (0.5%) had grades III–IV.

The most pterygium patients were those who did not have astigmatism complications as many as 148 eyes (71%) and those who had astigmatism complications as many as 61 eyes (29%). Astigmatism is a complication of pterygium. It was defined as the presence of at least 1 diopter of cylindrical refractive error on eye examination.

The most common visual acuity (visus) of pterygium patients was 6/9 as many as 33 people (15.8%) and the least was 2/60 as many as 2 people (2%).

The most common clinical manifestation was visual impairment with 187 people (50.3%) andthe least was lacrimation with 27 people (7.2%). Some patients presented with more than one clinical manifestation, resulting in a total count exceeding 152. Fourteen patients exhibited a single clinical manifestation, while the majority had multiple manifestations: 77 patients had two, 59 had three, and 2 patients presented with four clinical manifestations.

Table 2. Clinical characteristic of pterygium patients

Clinical Characteristic	Eyes		Total
	OD n(%)	OS n(%)	n (%)
Location			
Nasal	102 (48,8)	91 (43,5)	193 (92,3)
Temporal	5 (2,4)	5 (2,4)	10 (4,8)
Nasal et temporal	2 (1)	4 (1,9)	37 (2,9)
Total	109 (52,2)	100 (47,8)	209 (100)
Lateral-ization			
Unilateral	107 (51,2)	96 (45,9)	203 (97,1)
Bilateral	2 (1)	4 (1,9)	6 (2,9)
Total	109 (52,2)	100 (47,8)	209 (100)
Grade			
I	14 (6,7)	13 (6,2)	27 (12,9)
II	35 (16,7)	33 (15,8)	68 (32,5)
III	34 (16,3)	31 (14,8)	65 (31,1)
IV	26 (12,5)	23 (11)	49 (23,5)
Total			
Complication			
Astigmatism	36 (17)	25 (12)	61 (29)
No astigmatism	73 (35)	75 (36)	148 (71)
Total	109 (52,2)	100 (47,8)	209 (100)
Visus			
6/6	10 (4,9)	12 (5,7)	22 (10,6)
6/7,5	17 (8,1)	7 (3,3)	24 (11,4)
6/9	16 (7,7)	17 (8,1)	33 (15,8)
6/12	9 (4,3)	6 (2,9)	15 (7,2)
6/15	6 (2,9)	6 (2,9)	12 (5,8)
6/18	6 (2,9)	7 (3,3)	13 (6,2)
6/24	9 (4,3)	12 (5,7)	21 (10)
6/30	12 (5,7)	11 (5,3)	23 (11)
6/45	7 (3,3)	6 (2,9)	13 (6,2)
6/60	15 (7,2)	16 (7,6)	31 (14,8)
2/60	2 (1)	0 (0)	2 (1)
Total	109 (52,2)	100 (47,8)	209 (100)
Clinical Manifes-tation			
Iritation			43 (11,6)
Lacrimation			27 (7,2)
Visual impairment			187 (50,3)
Foreign body sensation			115 (30,9)
Total			372 (100)

DISCUSSION

The findings in this study were less than those in the Barbados Eye Study (11.6%)[6], Beijing Eye Study (4.9%)[7], Yunnan Minority Eye Study (6.8%)[8] and Korean cohort study (4.3%)[9]. However, these studies were conducted before the COVID-19 pandemic or used data below 2019 and not all studies were hospital-based. At *Rumah Sakit Khusus Mata Masyarakat*, there was a significant decrease in the number of patients coming to the hospital during the pandemic from 2019-2020. Researchers speculate that there may be a small incidence rate due to the reduction in pterygiumpatient visits. This may be due to the fear of COVID-19 infection among patients coming tothe hospital, resulting in fewer patients being diagnosed and studied.

In the study, it was found that many elderly patients suffered from pterygium. These results are in accordance with research by Tano et al. that there is a relationship between increasing age and increasing prevalence of pterygium.[12] Research conducted by Kau et al. showed that there was a significant relationship between p53 mutations in pterygium as the patient's age increased. This is because elderly individuals experience a decrease in the ability to repair damaged DNA, one of which is the role of the p53 gene.[13]

Women experienced more pterygium than men in this study. This is thought to be because women tend to come to health services earlier when there are eye problems and for aesthetic reasons. According to research in Pakistan, women have a higher awareness to seek information and health services in dealing with eye diseases they experience.[14] While the predominance of men in the general population is thought to be from environmental exposure due to more outdoor work than women.[15,16]

The findings in this study were that patients were predominantly working indoors. The majority of patients in this study are people who live in urban areas and have indoor jobs. The lack of long-term exposure to UV rays received by patients reduces the risk factors for pterygium.[10] Research by Mackenzie found that subjects whose jobs spent at least 5 years of their lives under sun exposure without protective equipment had a 20-fold risk of triggering pterygium compared to those who worked indoors more often.[11] Therefore, the factor of where many patients live in urban areas is also thought to have an effect on the low incidence rate in Palembang city.

Recent research by Lau et al. in Australia in 2022 hypothesized that the development of pterygium is thought to be due to light-emitting diode (LED) light waves from electronic devices whose wavelengths almost resemble UV light.[17] Given the increasing reliance on LED light sources in modern life, especially in

urban areas, researchers suspect that the number of patients who work indoors and the majority use electronic devices is a possible reason for the number of individuals in Palembang city suffering from pterygium.

Pterygium predominantly on the nasal side is thought to occur when exposure to sunlight passes through the medial cornea so that light is concentrated on the nasal limbus region, while the nasal shadow reduces the strength of light transmitted to the temporal limbus.[1]

Pterygium can be unilateral or bilateral with simultaneous growth of fibrovascular tissue or one first, so the prevalence of unilateral pterygium in general must be more than bilateral.[18] In a study by Ang et al who conducted research on three races in Malaysia, namely Malay, Chinese and Indian, it was found that genetic factors in the Indian race had a significant influence on the incidence of bilateral pterygium compared to the Malay and Chinese races.[19] Although Malaysia and Indonesia have the same geographical conditions, there are racial differences betweenthe two. This is thought to be the reason why Indonesia, especially in South Sumatra, which is predominantly Malay, has a low incidence ofbilateral pterygium.

In this study, it was found that the clinical manifestations of visual impairment affected daily activities, resulting in patients coming to the hospital. The main purpose of patients seeking professional help is for surgery. A study conducted in Ghana concluded that surgery can reduce astigmatism caused by pterygium up to four times.[20] A study conducted in India found that using conjunctival autograft techniques significantly improved vision affected by pterygium.[21] Therefore, the researcher suspects that these clinical manifestations are

dominant because the symptoms cannot be ignored by the patient and affect the patient's life significantly so that the patient chooses to request removal to improve the worsening of his vision.

Studies conducted in Pakistan concluded that the mean value of corneal astigmatism is higher in eyes with severe gradations of pterygium (grade III and grade IV) than in lighter gradations.[22] In the study conducted at the Eye Specialty Hospital, the majority of patients had grade II which is included in the low gradation so that more patients did not experience astigmatism than vice versa. Astigmatism occurs as the grade of the pterygium increases.[23] As the pterygium head approaches the corneal apex, the tear meniscus develops between the corneal apex and the raised pterygium. This causes a change in corneal curvature and induces astigmatism.[24]

Although there are differences in the results of the study, according to WHO, a visus of 6/6-6/12 is still considered normal. This is in line with the theory that the majority of pterygium gradations I and II do not experience changes in vision due to invasion of fibrovascular tissue growth that changes the refractive ability of the eye.[25]

Although pterygium is also categorized based on its progressivity, the mechanism that occurs is still unclear. A study by Sidharta was conducted to examine the relationship between Human Papilloma Virus (HPV) trigger factors and pterygium progressivity. The findings showed that the proportion of positive HPV in progressive pterygium was greater (67.7%) than the proportion of positive HPV in stationary pterygium and was statistically significant.

This is thought to be because HPV is a DNA virus that can trigger genetic changes. The main mechanism of the E6 protein of HPV is to interact with the p53 protein of the target cell to trigger the process of cancer development, in this case into a pterygium.[26]

Calculation of pterygium gradation is by measuring the length of the pterygium from the limbus, the greater the gradation, the longer the size of the pterygium. Research by Jeon et al in Seoul conducted a study on the relationship between increasing pterygium size and increasing induced astigmatism, the results of this study hypothesized that the contractile elements in the pterygium exert a traction force and mechanically distort and change the curvature of the central corneal curvature. Therefore, it can be concluded that a pterygium with a greater traction force or a greater amount of contractile tissue (higher grading) may lead to more severe pterygium-induced astismatism.[27,28]

According to a study by Tan et al. in Riau, there was no significant relationship between the gradation of pterygium lesions and vision, but it was found that higher gradations had poorer vision.[16] Progressive pterygium can invade and produce noticeable changes in the refractive ability of the eye and corneal curvature resulting in visual impairment or reduced vision.

CONCLUSION

The incidence of pterygium in *Rumah Sakit Khusus Mata Masyarakat* of South Sumatra Province in the period June 2019-June 2022 was obtained as many as 152 patients with 209 eyes affected by pterygium. The incidence rate of pterygium in RS Khusus Mata Masyarakat was 23 cases/1000 people. Pterygium was found mostly in women, aged 61-70 years, had indoor work, visus 6/9, nasal location, grade II, unilateral lateralization, clinical manifestations of foreign bodies, and had low astigmatism.

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