Research Article

Increased Age and Long Working Period Associated with Increased Severity of Pterygium Among Fishermen in Kedung Cowek Sub-District, Surabaya, East Java-Indonesia

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ABSTRACT

Pterygium is a degenerative and invasive disorder of the subconjunctival tissue that can reach the cornea area which is become a world-wide health problem. UV exposure is the biggest risk factor for pterygium. A profession as a fisherman is one of the occupations that are often related to the appearance of pterygium, because of long-term exposure to UV rays. This study aimed to determine the correlation between age and duration as a fisherman with the degree of pterygium in Kedung Cowek village, Bulak Surabaya district, East Java - Indonesia. The research design was an analytic observational using consecutive sampling during March - July 2011; with the total number of respondents is 42 fishermen who met the inclusion criteria. The results of the statistical analysis test showed that there was a strong and significant relationship between the age of the fishermen ($p = 0.007$; coefficient correlation = 502) and the duration of working as a fisherman ($p = 0.029$; coefficient correlation = 409) with the severity of the pterygium. Based on these results it can be concluded that the age and duration of work as fishermen are related to the severity of the pterygium in fishermen in the Kedung Cowek sub-district, Surabaya, East Java-Indonesia.

Keywords: *pterygium, fisherman, age and working period.*

Background

Pterygium is a subepithelial fibrovascular triangular formation that grows on the bulbs conjunctival tissue degeneratively from the limbus to the cornea (Moizuddin & Abdul, 2019). Pterygium growths occur most frequently in the nasal or temporal lid crevices of the conjunctiva extending into the cornea area.

The pterygium can affect both eyes, and if there is an inflammatory process the pterygium will be reddish (Padha et al., 2018). Pterygium is thought to be caused by chronic irritation from dust, sunlight, and hot air. Various theories of pterygium pathogenesis suggest sun exposure

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is the main cause of pterygium (Shah et al., 2016).

Pterygium has become one of the health problems in various parts of the world, but most cases are found in tropical countries. Without adequate therapy, it will cause visual disturbances and even blindness so that it requires operative action to completely rehabilitate visuals (Padha et al., 2018). Indonesia as a tropical country is ranked 4th out of 5 countries with the highest number of visual impairments (Kemenkes RI, 2018) and pterygium is listed as the second most common eye disorder after cataract. Basic Health Research Data (RISKESDAS) in 2013 showed the national prevalence of pterygium was 8.3%. There are 3 provinces with the highest prevalence of pterygium including Bali (25.2%), followed by Maluku (18.0%) and West Nusa Tenggara (17.0%) (Kemenkes RI, 2014)(Muchtar & Triswani, 2015).

The etiology of the pterygium is not known with certainty. Previous studies have shown that there are several factors associated with the incidence of pterygium, including genetic factors, wind, dry air, chemicals, air pollution, geographic location, and heredity (Serra et al., 2019)(Alemayehu et al., 2020). Several studies have also proven that pterygium is found in many tropical and subtropical countries is associated with UV exposure for a certain period (Alemayehu et al., 2020)(Prof Dr. Sanjay Kumar Singh, 2017). Pterygium also dominates the population who live in rural areas, with low economic status, low education levels, and people who work in outdoor environments (such as a fisherman, a farmer) so there is exposure to sun, wind, and dust (Alemayehu et al., 2020)(Prof Dr. Sanjay Kumar Singh, 2017). Based on the facts and phenomena above, the researcher will analyze the association between age and working period as a fisherman with the severity of pterygium in the coastal area of the Kedung Cowek sub-district, Bulak district, Surabaya, East Java, Indonesia.

Methods

This research design is analytical observational research with a cross-sectional study to determine the relationship between the degree

of pterygium with age and working period as fishermen in the Kedung Cowek sub-district. The research was conducted in the Kedung Cowek sub-district, Bulak District, Surabaya, and has obtained ethical clearance from the Faculty Medicine of Hang Tuah University research ethics committee.

Population and Sample Study

The population study is a fisherman with pterygium who resides in the Kedung Cowek sub-district. The sample study is a fisherman with pterygium who resided in Kedung Cowek sub-district and conducted eye examinations starting in March - July 2011 who met the inclusion criteria. The research sample was obtained based on purposive sampling, a type of non-probability sampling technique based on parameters previously developed by the researcher. The sample is not taken randomly, but is determined by the researcher for certain considerations or criteria.

The total number of respondents on this research is 42 people who met the study criteria as follows: fishermen with a minimum age of 30 years; had pterygium, pterygium extirpation had never been performed and the patient was cooperative, willing to participate in the study and signed an informed consent form.

Diagnosis of Pterygium

The diagnosis of pterygium is carried out by examining visual acuity using the Snellen chart and the anterior segment using a penlight by an ophthalmologist. Visual acuity examination was also carried out using Snellen charts. Respondent personal data obtained through filling out the form and direct interviews with respondents.

It is defined as a pterygium if a subepithelial triangular fibrovascular formation is found that grows on the bulbs conjunctival tissue degeneratively from the limbus to the cornea. The diagnosis of pterygium is classified according to its degree of severity as follows: (1) less than 2 mm toward the cornea. (2): 2 - 4 mm towards the cornea; (3) more than 4 mm toward the cornea (Christina et al., 2013).

Statistical Analysis

The types of data in this study are ordinal data, so the type of statistical analysis to test the correlation of the independent variables and the dependent variable uses the Spearman's rho non-parametric statistics with α value = 0.05. The purpose of using Spearman's rho is to determine whether the relationship between variables is significant or not; the strength of the relationship and the direction of the relationship from +1 to -1 (positive means that if the variable x increases, the y variable also increases; negative means that if the variable x increases, the y variable decreases)

Spearman's rho correlation coefficient interpretation uses the following reference: (1) perfect if 1; (2) very strong if 0.70 – 0.99; (3) strong if 0.40 – 0.69; (3) moderate if 0.3 – 0.39; (4) weak if 0.20 – 0.29; (5) negligible if 0.1 – 0.19 (6) none if 0 (Akoglu, 2018).

Results and Discussions

Based on the results of physical examination on the respondents, it shows that the gender, age, degree of pterygium, and working period as a fisherman distribution of respondents are as follows:

Table 1. Respondent Data Characteristics

Gender	Number	%
Male	32.00	76.19
Female	10.00	23.81
Age	Number	%
30-39 years	4.00	9.52
40-49 years	12.00	28.57
50-59 years	18.00	42.86
60-69 years	2.00	4.76
> 70 years	6.00	14.29
Degree	Number	%
1	14.00	33.33
2	22.00	52.38
3	6.00	14.29
Working Period as a Fisherman	Number	%
0-10 years	4	9.5
11-20 years	5	11.9
21-30 years	8	19.0
31-40 years	25	59.5

Table 1 shows that the total number of male respondents with pterygium (76.19 %) higher than female. These results are following the results of previous studies which showed that pterygium sufferers were in the majority of men than women. This is probably related to men's outdoor activities compared to women (Padha et al., 2018)(Shah et al., 2016).

The reason for the determination of a minimum age of 30 years in sample collection was based on the higher prevalence of pterygium in the age group of less than 30 years(Nangia et al., 2013). Table 1 shows that pterygium is mostly found at the age of 50 - 59 years

(42.86%). These results are in line with the research of Syed et al (2016) which showed that the average age of pterygium sufferers was 53.12 years, and it can occur in people aged 20-79 years (Shah et al., 2016). The frequency of pterygium increases with a rise in age, but this research provides different findings since the incidence rate shows a decline in age > 60 years. This is possibly attributed to the lower number of samples in the age range 60-69 and >70 years of age than in the age group 40-59 years of age. The correlation between age and pterygium was associated with long exposure to UV radiation (Nangia et al., 2013)

Based on the result on table 1, grade 2 pterygium (52.38 %) was the largest type compared to other types and the working period data of 31-40 years (59.5%) was the data range with the highest frequency. These data suggest that a longer working time is equal to a longer

UV exposure, thus raising the occurrence of pterygium.

The results of the correlation test between age and the severity of the pterygium can be seen in the table below:

Table 2. The Correlation Test Between Age and The Degree of Pterygium

Age (years)	Degree of Pterygium			Statistical Analysis
	1	2	3	
30-39	1	3	0	p value = 0.007
40-49	7	5	0	
50-59	6	10	2	
60-69	0	2	0	
> 70	0	2	4	correlation coefficient = 0.458
Total	14	22	6	

Table 2 shows that there is a significant correlation between age and the severity of the pterygium with a strong positive correlation (more than 0.25) (Akoglu, 2018), so it can be concluded that increasing age is related to the severity of the pterygium. Previous studies have concluded that there is a significant positive trend between the prevalence of

pterygium and increasing age (Liu et al., 2013). This may be due to accumulated UV exposure with age, which increases the predisposition for pterygium (Akoglu, 2018).

The correlation between the degree of pterygium and duration of UV exposure can be seen in the table below:

Table 3. The Correlation Test Between Duration of Being a Fisherman and The Degree of Pterygium

Working Period as a Fisherman	Degree of Pterygium			Statistical Analysis
	1	2	3	
0-10 years	3	0	0	p value = 0.029
11-20 years	2	3	0	
21-30 years	3	6	0	
31-40 years	6	13	6	
Total	14	22	6	Correlation coefficient = 0.409

Based on the result of table 3 shows that there is a significant and strong association/correlation between the duration of being a fisherman and the degree of pterygium (more than 0.25) (Akoglu, 2018). The results of this study are following the results of research by Novita (2017) which states that there is a significant relationship between the length of work of fishermen and the incidence of pterygium. This is because the longer the working period as a fisherman increases the duration of UV exposure (Rany, 2017). Pterygium pathogenesis is caused by chronic inflammatory

processes involving IL-6, IL-8 and VEGF in eye tear film secretions. Pterygium histopathology is characterized by aggregation of leukocytes (neutrophils, monocytes, mast cells and T-lymphocytes), angiogenesis and epithelial hyperplasia (Rany, 2017). Increased recruitment of leukocytes in the epithelial eye region is activated by IL-6 and IL-8, and IL-6 itself has an effect on the activation of VEGF, increasing angiogenesis. IL-8 is capable of inducing epidermal cell division, which causes epithelial hyperplasia in pterygium. People exposed to UV (especially UVB) induce increased IL-6 and IL-8

production in eye tear film that induces pterygium (Rany, 2017). The literature study by Zhout et al (2016) reveals that UV triggers mutations in limbal stem cells and limbal fibroblasts that increase the development of proinflammatory cytokines (IL-1, IL-6 and IL-8), growth factors, matrix metalloproteinases, thereby inducing inflammation, fibrogenesis (TGF β /transforming growth factor beta), angiogenesis that together induces pterygium formation (Zhou et al., 2016). These results support the hypothesis that pterygium is associated with tropical/subtropical climate and outdoor activity with pterygium (Alemayehu et al., 2020)(Prof Dr. Sanjay Kumar Singh, 2017).

Conclusion

The results of this study concluded that there was a strong and significant relationship between increasing age and length of work with the severity of pterygium among fishermen in the Kedung Cowek sub-district, Surabaya, East Java-Indonesia. These results reinforce the hypothesis that accumulated sun exposure over a long period causes the appearance of the pterygium, even initiating the progressive development of the pterygium.

It is necessary to do counseling to the community in the Kedung Cowek sub-district about the etiology, risk factors, impacts, and preventive measures of pterygium through banners, leaflets, and posters.

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