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Original article

The epidemiology of patients with pterygium in southern Taiwanese adults: The Chiayi survey☆

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ABSTRACT

Purpose: To investigate patients with pterygium in different geographic regions and the associated risk factors in southern Taiwan.
Methods: A clinical observation survey was conducted in Chiayi County, a rural area in southern Taiwan. The subjects aged 40 years and above underwent complete ocular examinations. Associated risks factors were evaluated, including gender, age, occupations, smoking, and geographical living regions by univariant and multivariant logistic regression analysis.
Results: A total of 2197 participants (790 male, 36.0%) from 44 different villages were evaluated. In these, 554 participants (25.2%) have either unilateral or bilateral pterygium. Age is associated with the percentage of pterygium, and those aged between 60 and 69 had the highest percentage of 30.1% ($p < 0.0001$). The gender effect was higher among men than women (OR = 1.31, 95% CI: 1.08–1.60, $p = 0.006$). The percentage of pterygium lived in plain, seaside, and mountainous areas were 22.6%, 32.6%, and 14.5% respectively. Geographical regions also showed that seaside area had the highest percentage of pterygium (seaside area OR = 1.65, 95% CI: 1.35-2.03, and mountainous area OR = 0.58, 95% CI: 0.35-0.95 compared with plain areas). Primary outdoor workers and residents with smoking history had relative higher risk for pterygium (OR = 1.47, 95% CI: 1.17-1.86; OR = 1.36, 95% CI: 1.02-1.83).
Conclusions: The percentage of pterygium in southern Taiwan is about 25.2% among adults aged over 40 years in this survey. It is significantly higher in the age of 50 or more and in residents living in villages along the seaside than those living in the mountainous and the plain areas.

1. Introduction

Pterygium is an elevated, superficial, external ocular wedge-shaped dysplasia of bulbar conjunctiva that extends onto the cornea.[1,2] In addition to cosmetic reasons, the extension of pterygium is correlated with corneal astigmatism[3,4] and could lead to blinding disease in advanced stages owing to obscure the optical center of the cornea.[4] The etiopathogenesis of pterygium is still not fully elucidated. Sunlight overexposure, genetic factors, or other lifestyle behaviors may contribute to the development of pterygium.[5] Over-expression of vascular endothelial growth factor (VEGF) in angiogenesis of pterygium tissue may play an important role in the formation of pterygium.[6] The prevalence rates of pterygium, according to previous studies, ranged from 1.2% to 23.4%[4,7–12] and 7% to 14.49% among Chinese aged over 40 years.

Pterygium formation is associated significantly with outdoor work and sunlight exposure associated with a broad band of ultraviolet radiation exposure.[10–18] People with special occupation like salt workers, working outdoors postmen, or motorcycle policemen have a relative higher risk of developing pterygium probably because of their long duration of sunlight exposure.[18–22]

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Wearing sunglasses, brimmed hats, and other devices and avoiding unnecessary sunlight exposure are important for prevention.[17–22]

To the best of our knowledge, the risk factors associated with the geographic characteristics have not been established in the sea island country. In this study, we determine the correlation between the development of pterygium and the risk factors that contributed to pterygium in different geographic regions and associated risk factors like gender, smoking behavior, and primary outdoor or indoor work among the adult population in southern Taiwan.

2. Methods

Community Complex Health Screening, a large-scale, free health program for people aged over 40 years was conducted in Chiayi County, a rural area located in southern Taiwan, half way between Taipei and Kaohsiung at 23.5° north of the Equator, with a subtropical climate. The geographic characteristics consist of plain, seaside (3 ridings nearby sea), and mountainous regions (3 ridings among the Central Mountain of Taiwan). This survey was attached to a huge health care designed—Mobile Hospital Health Delivery—to send medical service to villages for good medical health care. This mobile medical care system will approach those villages selected and geographically in different ridings each week. A total of 2197 subjects (790 male, 36.0%) from 44 different rural villages belonged to 18 ridings of the Chiayi County were evaluated since September 2006 to October 2007. The residents aged over 40 years old, living in those villages and participated voluntarily were all included to this survey.

All participants underwent complete ocular examinations, such as external ocular photography and associated risk factor and history taking by the same ophthalmologist. According to the previous studies, pterygium was graded in three levels of severity.[4,10] The three grades, based on relative transparency of pterygium tissue, were Grade 1 (transparent), Grade 2 (intermediate), and Grade 3 (opaque). In a Grade 1 pterygium, the episcleral vessels underlying the body of the pterygium were clearly visible. In a Grade 3 pterygium, the episcleral vessels were totally obscured. All other pterygia not classified as Grade 1 or 3 were classified as Grade 2.[10]

Associated risks factors for pterygium were evaluated, including gender, age, occupations, smoking, and geographical living regions, including plain, seaside, and mountainous areas. We divided the residents into primary outdoor workers (over 4 hours of sun exposure each day), indoor, and with or without smoking. This study was approved by Chang Gung Memorial Hospital Institutional Review Board. All research procedures followed the tenets of the Declaration of Helsinki.

3. Statistical analysis

Data were analyzed using Chi-square test or Fisher's exact test (if the expected value was under 5) for the univariate analysis of factors associated with pterygium. Probability values of $p < 0.05$ were considered statistically significant. In addition, logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for pterygium associated with possible risk factors. Variables that were significant at the $p < 0.1$ level in the univariate analysis were included in backward logistic regression analysis to select the final list of independent variables. All analyses were computed using SPSS software (v10.0, SPSS Inc, Chicago, IL, USA).

4. Results

A total of 2197 subjects (790 male and 1407 female, 36.0% and 64.0% respectively) from 44 different villages were evaluated at the health survey of Chiayi County government from September 2006 to October 2007. Of these, 554 subjects (25.2%, 95% CI: 23.4-27.1) have either unilateral or bilateral pterygium in the southern Taiwanese people aged 40 and older (Table 1).

The percentage is 28.6% (95% CI: 25.5-31.8) in males and 23.3% (95% CI: 21.1-25.6) in females. In both male and female groups, the percentage rose rapidly followed by the increase in age.

Considering the pterygium percentage 22.6% (95% CI: 20.5-24.9) of residents who are living in plain area, the percentage is 32.6% (95% CI: 32.0-44.5), which is relatively higher, for those living in the seaside area and 14.5% (95% CI: 9.6-21.4) in mountainous areas ($p < 0.001$). The percentage in subjects with smoking history is

Table 1
Percentage of pterygium in residents with associated risk factors.

Variable		*N*	Pterygium in either eye			Bilateral pterygium		
			n	Rate (%)	95% CI	*n*	Rate (%)	95% CI
Age (y)	40–49	110	5	4.5	1.9–10.2	1	0.9	0.1–4.9
	50–59	267	52	19.4	15.1–24.6	18	6.7	4.3–20.4
	60–69	773	233	30.1	27.0–33.4	74	9.5	7.6–11.8
	70+	1047	264	25.2	22.6–27.9	96	9.1	7.3–11.0
	p value	$p < 0.0001$				$p = 0.0128$		
Gender	Female	1407	328	23.3	21.1–25.5	104	7.4	6.0–8.8
	Male	790	226	28.6	25.4–31.8	85	10.8	8.4–12.8
	p value	$p = 0.006$				$p = 0.007$		
Work	Primarily outdoor	1181	321	27.1	24.7–29.7	116	9.8	8.2–11.6
	Primarily indoor	644	130	20.1	17.2–23.4	42	6.5	4.8–8.6
	p value	$p = 0.002$				$p = 0.055$		
Residence	Plain	1390	315	22.6	20.5–24.9	105	7.5	6.2–9.0
	Mountain	137	20	14.5	9.6–21.4	0	—	—
	Seaside	670	219	32.6	32.0–44.5	84	12.5	10.2–15.2
	p value	$p < 0.0001$				$p < 0.0001$		
Smoking	Smoker	170	74	30.3	24.9–36.3	28	11.4	8.0–16.0
	No smoker	1407	448	24.1	22.2–26.1	148	7.9	6.8–9.3
	p value	$p = 0.036$				$p = 0.064$		

All the *p*-values are found by Chi-square test.
N = Case number of population, *n* = case number with pterygium, 95% CI = 95% confidence interval.