

# Correlation of Pterygium among Timber Workers in Owerri with Some Socio-Demographic Factors and use of Protective Eye Wear

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## ABSTRACT

*Pterygium is one of the common eye problems seen among workers in the timber industry. This study was a cross sectional study conducted to assess the prevalence of occupation related pterygium among timber workers in Owerri North Local Government Area of Imo State, Nigeria and to establish if possible, a correlation of pterygium with socio-demographic characteristics of the timber workers and their use of protective eyewear. This study was carried out at the Timber and Allied Market at Egbu/Naze, Owerri North Local Government Area of Imo State, Nigeria and comprised of 518 timber workers aged 11-80 years (mean age 43.42 ± 12.94 SD). Males were 443(85.5%) while females were 75(14.5%). Prior observation and assessment of the worksites was carried*

*out and brief interviews also conducted to collect information. A pretested structured questionnaire designed to collect information on the socio-demographic characteristics of the workers and their use of protective eye wear was also administered. Comprehensive eye screening exercise was carried out on site at the timber shade using a standard room in their office complex. Data obtained was analyzed using the Statistical Package for Social Sciences (SPSS version 20). Appropriate descriptive and inferential statistics were used to present the results of the study. Chi-square ( $X^2$ ) statistical analysis, Phi and Cramer's V correlation coefficients were used to test for relationships and the strength of the associations between prevalence of pterygium and socio-demographic factors such as age, level of education, department and years of*



*exposure, and use of protective eye wears.  $P < 0.05$  was considered significant. Results showed that the overall prevalence of pterygium among the surveyed group was 46.5%. High prevalence of pterygium was significantly related to older age, lower level of education, furniture department, higher number of years of exposure and lack of use of protective eye wear when the prevalence within groups were compared. Eye care centers should be set up within or around timber work sites to take care of the timber workers ocular needs promptly. Enlightenment programmes should also be organized by the government and eye care professionals to create awareness and sensitize timber workers on the importance of the use of protective eyewear.*

## **KEYWORDS:**

Correlation; Pterygium; Timber; Socio-demographic factors; Protective eyewear.

## **INTRODUCTION**

Pterygium is one of the common eye problems seen among workers in the timber industry<sup>1, 2</sup>. It is a non-malignant, slow-growing proliferation of conjunctival connective tissues in the eye. It can also be described as a triangular fleshy, usually nasally located, fibrovascular tissue growth on the eye, which protrudes from the conjunctiva, extends over and slowly invades the transparent cornea causing impaired vision in some cases<sup>3</sup>. It is not just a degenerative disease, but may be a proliferative disorder of the ocular surface. Pterygium may result from several causes such as exposure to ultraviolet light from the sun, dust, wind, extremely dry conditions, or

fumes/smokes from fuel and gases used for the powering of machines<sup>2</sup>.

Timber work is one of the dominant occupations in Nigeria, providing income and employment opportunities for a large number of individuals in the country. In Imo State, Nigeria, the Timber and Allied Market at Egbu/Naze, Owerri North Local Government Area hosts the biggest timber industry in the state. The timber layout boasts of over 700 timber workers engaged in various forms of timber work process and is very well organized into different departments according to the kind of timber work done viz: wood logging, wood chip/dust packing, sawmilling, furniture making, and wood chopping and selling.

The timber industry in Nigeria generates a lot of environmental pollutants and puts the timber workers at risk of various eye problems of which pterygium is one of them. Common agents implicated in the causation of ocular problems among timber workers include wood, wood dust / chips, sun, chemicals used for wood processing and preservation, falling debris, contaminated particles, flying objects (both wood and metals) and various types of fuel and gaseous emissions, each of which play a part in the general health condition of the eye; Indeed they cause ocular problems<sup>4, 1, 5, 6</sup>.

In Nigeria, most of the timber work processes are performed outdoors. Timber workers engaged in outdoor work processes are thus at added risk of chronic exposure to sunlight and ultimately ultraviolet radiations (290-400 nm), as are other outdoor workers<sup>7</sup>. Hence they are at risk of developing ocular disorders, such as pterygium<sup>8, 9</sup>. Those in the tropics also have a



greater risk because of hot, dry, dust-filled work environment. This study evaluated the prevalence of occupation related pterygium among timber workers in Owerri North LGA of Imo State, Nigeria and the possibility of a relationship between the prevalence of pterygium, some socio-demographic factors and use of protective eye wear.

## METHODOLOGY

This was a cross sectional study carried out to assess the prevalence of occupation related pterygium among timber workers in Owerri North Local Government Area of Imo State, Nigeria. This study was carried out at the Timber and Allied Market at Egbu/Naze, Owerri North Local Government Area which hosts the biggest timber industry in Imo state and comprised of five hundred and eighteen (518) timber workers aged 11-80 years. Males were 443 while females were 75.

The timber workers were grouped according to their departments and participants were examined from the various departments as they presented themselves for the eye examination. Workers who had a history of pterygium prior to commencement of work at the timber industry were excluded to ensure all the cases of pterygium recorded were occupation related. Correlation of pterygium with socio-demographic characteristics of the timber workers and their use of protective eyewear was also ascertained.

Institutional approval to carry out the study was obtained from the Department of Public Health, Federal University of Technology Owerri, Imo State. Advocacy visits were made to the Timber and Allied Market of Egbu/Naze,

Owerri North Local Government Area of Imo State and consent obtained from the management prior to the commencement of the study. This research was conducted on voluntary basis and respondents read informed consent letters attached to the questionnaire before taking part in the research. They were all briefed on how the research would be performed and assured about the confidentiality and anonymity of the information so obtained. Examination procedures were also thoroughly explained.

Prior observation and assessment of the worksites was carried out, and different timber workshops and sections were visited for an on spot assessment of the timber work layout, processes and state of work environment, and to collect information on preliminary occupational hygiene and safety practices. Brief interviews were also conducted to collect more information.

A pretested structured questionnaire designed to collect information on the socio-demographic characteristics such as age, sex, department, educational level, years of exposure, eye health complaints and use of protective eye wear among the timber workers was also administered.

Comprehensive eye screening exercise was carried out on site at the timber shade using a standard room in their office complex. This was the major source of information for the study and was aimed at identifying occupation related pterygium among the timber workers. This screening exercise involved direct eye examination using eye instrument such as pen-torch, ophthalmoscope, retinoscope,



magnifying loupe, near and distant snellens visual acuity Charts both for the literate and the illiterate, and tonometer. All materials were cleaned and sterilized as appropriate. A diagnosis of pterygium was made in the presence of a wedge-shaped fibrovascular sub-epithelial ingrowth of degenerative bulbar conjunctiva tissue. Subjects identified with eye problems were counseled and referred, no interventions were instituted on site for these individuals.

Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS version 20). Appropriate descriptive and inferential statistics were used to present the results of the study. Chi-square ( $X^2$ ) statistical analysis, Phi and Cramer's V correlation coefficients were used to test for relationships and the strength of the associations between prevalence of pterygium and socio-demographic factors such as age, level of education, department and years of exposure, and use of protective eye wears.  $P < 0.05$  was considered significant.

Phi and Cramer's V values of 0.1 to  $< 0.5$  were considered as a weak relationship, 0.5 to  $< 0.8$  indicated moderate relationship while 0.8 and above was considered a strong relationship. Gamma analysis was used to assess the direction of the relationship for ordinal by ordinal analysis with a negative Gamma value indicating a negative or inverse relationship and a positive Gamma value indicating a positive or direct relationship.

## RESULTS

A total of five hundred and eighteen (518) timber workers between the ages 11-80 years (mean age  $43.42 \pm 12.94$  SD) were examined.

Four hundred and forty three (443; 85.5%) were males while 75(14.5%) were females.

Two hundred and forty one (241) out of the total 518 timber workers examined had pterygium, giving a general prevalence of 46.5% (Figure 1). When the prevalence of pterygium in the different age groups were compared, it was observed that the prevalence of pterygium was least within age group 11-20 (0.0%) and highest at 62.5% within age group 71-80 years (Table 1). Occurrence of pterygium had a significant relationship with age and this relationship was in the positive direction as shown in table 6 ( $P < 0.001$ , Phi = 0.241, Cramer's V = 0.241, Gamma = 0.291). This implies that high prevalence of pterygium was related to older age and thus prevalence of pterygium will increase with advance in age.

The prevalence of pterygium was highest (100.0%) in the group of timber workers who had no formal education as all the 32 examined timber workers without a formal education had pterygium (Table 2). This prevalence decreased to 54.2% within the group of workers who had primary education, then to 41.7% among those with secondary education before finally reducing to the least prevalence of 23.4% among the group of workers with a tertiary education (Table 2). There was a significant correlation between occurrence of pterygium and level of education ( $P < 0.001$ . Phi = 0.319, Cramer's V = 0.319) and this relationship was in the inverse direction as shown by a Gamma value of -0.478 (Table 6) indicating that the prevalence of pterygium increased with lowered level of education.

As shown in table 3, the prevalence of pterygium was highest within furniture department (70.0%) and least within sawmill department (35.2%). This relationship between





occurrence of pterygium and work department was significant as indicated in table 6 ( $P = 0.002$ ,  $\Phi = 0.217$ , Cramer's  $V = 0.217$ ) but the direction of this relationship was insignificant ( $\Gamma = 0.007^{**}$ ).

In table 4, the prevalence of pterygium increased with number of years of exposure from 27.2% within the group of workers with less than 5 years of exposure, to 47.8% within the group with 5-10 years exposure, and then peaked to 55.5% within the group with over 10 years of exposure. This indicates that high prevalence of pterygium is significantly and positively related to prolonged number of years of exposure ( $P < 0.001$ ,  $\Phi = 0.217$ , Cramer's  $V = 0.217$ ,  $\Gamma = 0.331$ ).

One hundred and fifty two (152; 29.3%) timber workers used protective eye wear either always 48 (9.3%), occasionally 79 (15.3%) or rarely 25 (4.8%) while 366 (70.7%) did not. The prevalence of pterygium was significantly related to the use of protective eyewear ( $P < 0.001$ ,  $\Phi = 0.433$ , Cramer's  $V = 0.433$ ,  $\Gamma = -0.226$ ). The prevalence of pterygium was higher among the group of timber workers who did not use protective eye wear (60.4%) while the group who used protective eye wear irrespective of the wearing modality (either always, occasionally or rarely), had the least prevalence (13.2%) of pterygium (Table 5).

## DISCUSSION

According to the results of this study, the general prevalence of pterygium was 46.5% which is higher than the 12.53% prevalence recorded by Esenwa<sup>1</sup> in his study in 2008. Timber workers have been reported to usually have high prevalence rates of pterygium<sup>10</sup>, and increased years of working outdoors and

exposure to timber work hazards such as wood chip, dust and sun have been attributed as risk factors for the development of pterygium<sup>7, 11</sup>.

The increased prevalence of pterygium recorded in this study is probably due to prolonged number of years of repeated exposure to occupational hazards resulting in timber workers who previously had no pterygium developing it and thus increasing the prevalence of pterygium. Most of the timber work processes are performed outdoors and timber workers engaged in outdoor work processes are at added risk of chronic exposure to ultraviolet radiations as are other outdoor workers<sup>7</sup>. This increases their risk of developing pterygium<sup>8, 9</sup>.

The prevalence of pterygium was least in the age group 11-20 and highest in age group 71-80 years. Higher prevalence of pterygium was related to older age indicating that there is a correlation between pterygium and age. This finding is in line with the reports of other studies<sup>1, 3, 11-14</sup> which also observed that a higher prevalence of pterygium was associated with older age, and may be attributed to the presence of these categories of workers over the years at the work site resulting in increased cumulative lifetime exposure to occupational hazards such as sunlight, wood chip and dust<sup>1</sup>.

The prevalence of pterygium increased with lowered level of education with the timber workers with a tertiary education having the least prevalence and those without formal education having the highest prevalence. This result is in accordance with that of other studies<sup>3, 15</sup> which also found that the high prevalence of pterygium was associated with lower level of education. This reduction in the prevalence of pterygium with advance in level of education can be attributed to the increased



level of enlightenment and awareness that comes with education such that most educated people are usually aware of the hazards in their environment and the associated health implications and thus make frantic efforts to prevent them.

The prevalence of pterygium was highest within furniture department (70.0%) and least within sawmill department (35.2%). This is contrary to most believes that since more wood dusts are produced in sawmills, pterygium is expected to be more prevalent there than in any other aspect of timber work. This could be accounted for by the fact that most of the timber workers examined from the furniture department often times carried out their furniture making processes outdoor, under the sun and thus were more likely to record greater daytime sunlight and consequently ultraviolet radiation exposures than sawmill workers who usually are seen working inside workshops or under constructed shades. There was a significant correlation of pterygium with department. However, the direction of this relationship was insignificant.

In line with other studies<sup>3, 11</sup>, the prevalence of pterygium increased with number of years of exposure from 27.2% in the group of workers with less than 5 years exposure, to 47.8% in the group with 5-10 years exposure and then a peak of 55.5% in the group with over 10 years exposure. This higher prevalence in timber workers with more years of exposure may be due to prolonged, continuous exposure to occupational hazards, long years of working outdoors and accumulation of desiccation, wood dust and chips over the years<sup>1</sup>.

There was a significant correlation between pterygium and the use of protective eyewear. The prevalence of pterygium was higher

among the group of timber workers who did not use protective eye wear during work. This correlates with the report of a study<sup>10</sup> which stated that the risk of degenerative disorders such as pterygium could be increased due to poor compliance with safety eyewear during work.

## CONCLUSION

The prevalence of pterygium among the timber workers in this study is high and preventive measures such as protection of the eyes by wearing of sunglasses with UV B protective lenses is highly recommended during timber work. Enlightenment programmes should be organized frequently to educate the workers regarding the use of eye protection and strict adherence to such safety measures by timber workers should also be enforced by the appropriate authorities.

Well-structured engineering controls should be employed to ensure reduction and proper control of risk of exposure to wood dust especially among the older timber workers and eye care centers should also be set up within or around timber work sites to take care of the workers ocular needs promptly.

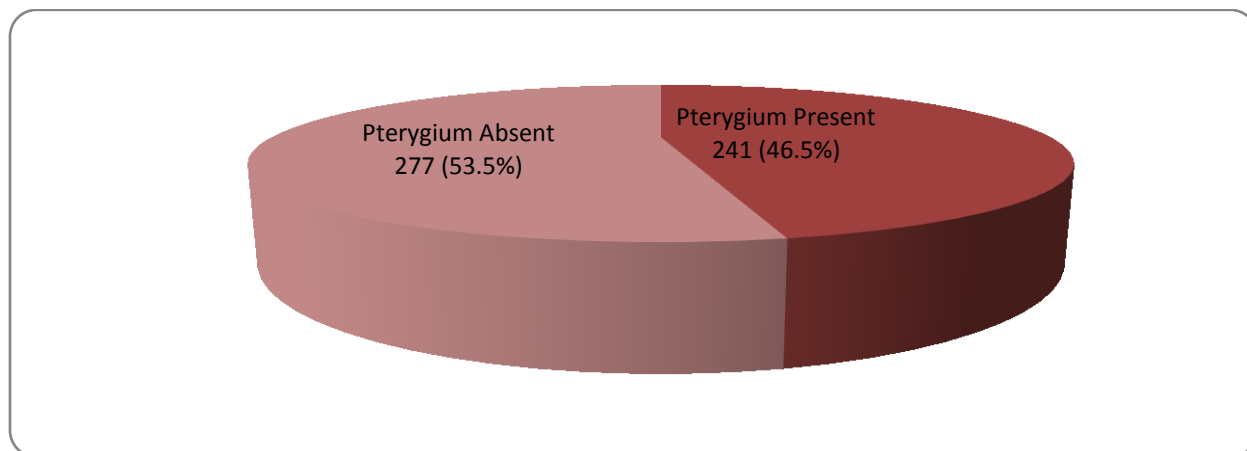
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**Figures and tables**



**Figure 1: General Prevalence of Pterygium among Surveyed Group**

**Table 1: Age-related Prevalence of Pterygium among the Surveyed Group**

Age Group (Years)	Pterygium		Total	
	Absent	Present		
11-20	Frequency	7	0	7
	% within Age group	100.0%	0.0%	100.0%
	% within Pterygium	2.5%	0.0%	1.4%
	% of Total	1.4%	0.0%	1.4%
21-30	Frequency	58	20	78
	% within Age group	74.4%	25.6%	100.0%
	% within Pterygium	20.9%	8.3%	15.1%
	% of Total	11.2%	3.9%	15.1%
31-40	Frequency	88	66	154
	% within Age group	57.1%	42.9%	100.0%
	% within Pterygium	31.8%	27.4%	29.7%
	% of Total	17.0%	12.7%	29.7%
41-50	Frequency	50	66	116
	% within Age group	43.1%	56.9%	100.0%
	% within Pterygium	18.1%	27.4%	22.4%
	% of Total	9.7%	12.7%	22.4%
51-60	Frequency	51	60	111
	% within Age group	45.9%	54.1%	100.0%
	% within Pterygium	18.4%	24.9%	21.4%
	% of Total	9.8%	11.6%	21.4%
61-70	Frequency	20	24	44
	% within Age group	45.5%	54.5%	100.0%



	% within Pterygium	7.2%	10.0%	8.5%
	% of Total	3.9%	4.6%	8.5%
71-80	Frequency	3	5	8
	% within Age group	37.5%	62.5%	100.0%
	% within Pterygium	1.1%	2.1%	1.5%
	% of Total	0.6%	1.0%	1.5%
<b>Total</b>	Frequency	277	241	518
	% within Age group	53.5%	46.5%	100.0%
	% within Pterygium	100.0%	100.0%	100.0%
	% of Total	53.5%	46.5%	100.0%

**Table 2: Educational Level-related Prevalence of Pterygium among the Surveyed Group**

Level of Education		Pterygium		Total
		Absent	Present	
No formal education	Frequency	0	32	32
	% within Level of education	0.0%	100.0%	100.0%
	% within Pterygium	0.0%	13.3%	6.2%
	% of Total	0.0%	6.2%	6.2%
Primary	Frequency	54	64	118
	% within Level of education	45.8%	54.2%	100.0%
	% within Pterygium	19.5%	26.6%	22.8%
	% of Total	10.4%	12.4%	22.8%
Secondary	Frequency	187	134	321
	% within Level of education	58.3%	41.7%	100.0%
	% within Pterygium	67.5%	55.6%	62.0%
	% of Total	36.1%	25.9%	62.0%
Tertiary	Frequency	36	11	47
	% within Level of education	76.6%	23.4%	100.0%
	% within Pterygium	13.0%	4.6%	9.1%
	% of Total	6.9%	2.1%	9.1%
<b>Total</b>	Frequency	277	241	518
	% within Level of education	53.5%	46.5%	100.0%
	% within Pterygium	100.0%	100.0%	100.0%
	% of Total	53.5%	46.5%	100.0%

**Table 3: Department-related Prevalence of Pterygium among the Surveyed Group**

Department	Pterygium		Total	
	Absent	Present		
Dust Clearing	Frequency	38	35	73
	% within Department	52.1%	47.9%	100.0%
	% within Pterygium	13.7%	14.5%	14.1%
	% of Total	7.3%	6.8%	14.1%
Furniture	Frequency	12	28	40
	% within Department	30.0%	70.0%	100.0%
	% within Pterygium	4.3%	11.6%	7.7%
	% of Total	2.3%	5.4%	7.7%
Logging	Frequency	42	24	66
	% within Department	63.6%	36.4%	100.0%
	% within Pterygium	15.2%	10.0%	12.7%
	% of Total	8.1%	4.6%	12.7%
Sawmill	Frequency	57	31	88
	% within Department	64.8%	35.2%	100.0%
	% within Pterygium	20.6%	12.9%	17.0%
	% of Total	11.0%	6.0%	17.0%
Wood Chopping & Selling	Frequency	128	123	251
	% within Department	51.0%	49.0%	100.0%
	% within Pterygium	46.2%	51.0%	48.5%
	% of Total	24.7%	23.7%	48.5%
<b>Total</b>	Frequency	277	241	518
	% within Department	53.5%	46.5%	100.0%
	% within Pterygium	100.0%	100.0%	100.0%
	% of Total	53.5%	46.5%	100.0%

**Table 4: Years of Exposure-related Prevalence of Pterygium among the Surveyed Group**

Years of Exposure (Years)		Pterygium		Total
		Absent	Present	
<5	Frequency	83	31	114
	% within Work Experience	72.8%	27.2%	100.0%
	% within Pterygium	30.0%	12.9%	22.0%
	% of Total	16.0%	6.0%	22.0%
5-10	Frequency	97	89	186
	% within Work Experience	52.2%	47.8%	100.0%
	% within Pterygium	35.0%	36.9%	35.9%
	% of Total	18.7%	17.2%	35.9%
>10	Frequency	97	121	218
	% within Work Experience	44.5%	55.5%	100.0%
	% within Pterygium	35.0%	50.2%	42.1%
	% of Total	18.7%	23.4%	42.1%
<b>Total</b>	Frequency	277	241	518
	% within Work Experience	53.5%	46.5%	100.0%
	% within Pterygium	100.0%	100.0%	100.0%
	% of Total	53.5%	46.5%	100.0%

**Table 5: Distribution of Occurrence of Pterygium according to Use of Protective Eye Wear among Surveyed Group**

Use of Protective Eyewear		Pterygium		Total	
		Absent	Present		
<b>Used</b>	<b>Always</b>	Frequency	44	4	48
		% within Level of Use of Protective Eyewear	91.7%	8.3%	100.0%
		% within Pterygium	15.9%	1.7%	9.3%
		% of Total	8.5%	0.8%	9.3%
	<b>Occasionally</b>	Frequency	67	12	79
		% within Level of Use of Protective Eyewear	84.8%	15.2%	100.0%
		% within Pterygium	24.2%	5.0%	15.3%
		% of Total	12.9%	2.3%	15.3%
	<b>Rarely</b>	Frequency	21	4	25
		% within Level of Use of Protective Eyewear	84.0%	16.0%	100.0%
		% within Pterygium	7.6%	1.7%	4.8%
		% of Total	4.1%	0.8%	4.8%
<b>Total Who Used</b>	Frequency	132	20	152	
	% within Level of Use of Protective Eyewear	86.8%	13.2%	100.0%	
	% within Pterygium	47.7%	8.3%	29.3%	
	% of Total	25.5%	3.9%	29.3%	
<b>Did Not Used</b>	Frequency	145	221	366	
	% within Level of Use of Protective Eyewear	39.6%	60.4%	100.0%	
	% within Pterygium	52.3%	91.7%	70.7%	
	% of Total	28.0%	42.7%	70.7%	
<b>Grand Total</b>	Frequency	277	241	518	
	% within Level of Use of Protective Eyewear	53.5%	46.5%	100.0%	
	% within Pterygium	100.0%	100.0%	100.0%	
	% of Total	53.5%	46.5%	100.0%	

**Table 6: Statistical Analysis Showing Correlation of Pterygium with Socio-demographic Factors and Use of Protective Eye wear among the Surveyed Group**

	Chi-square (X <sup>2</sup> )	Degree of Freedom (DF)	P-value	Phi	Cramer's V	Gamma
Age*Pterygium	30.099	6	<0.001	0.241	0.241	0.291
Educational Level * Pterygium	52.648	3	<0.001	0.319	0.319	-0.478
Department * Pterygium	16.79	4	0.002	0.180	0.180	0.007**
Years of Exposure * Pterygium	24.32	2	<0.001	0.217	0.217	0.331
Use of Protective eye wear * Pterygium	96.93	3	<0.001	0.433	0.433	-0.226

\*\*Insignificant Gamma value