



Ocular Morbidities Associated with Workers in Brewing Industries

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Authors' contributions

This work was conducted in collaboration between both authors. Author UCB conceived the study, wrote the first draft, and carried out data analysis. Author AOP interpreted the findings. Both authors discussed, reviewed the results and wrote the conclusion. Both authors participated in scientific content, discussion and review of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Introduction: Globally, ocular morbidities have worsened the rate of visual impairments. It was estimated that about 285 million people are visually impaired, 39 million are blind, and 246 million have low vision. The process of beer production can lead to various eye morbidities or injuries to the workers, and these injuries are preventable. This study investigated the prevalent ocular conditions and their causes among workers in brewery Industries.

Methodology: This study employed a cross-sectional study design and was carried out in three different breweries. A total of 400 participants consisting of 279 males and 121 females were enrolled in this study. Questionnaires and eye examination were used to collect data. Descriptive statistics were used to analyze and summarize the data.

Results: Our findings revealed that pterygium (30%, 24.8% & 24.1% respectively) was the highest prevalent ocular morbidity among workers in the brewing industry. Pinguecula (21.5%, 23.2% & 17.9%) and allergic conjunctivitis (18.5%, 13.6% & 7.6%) were also prevalent. Correspondingly, exposure to foreign body/dust particles (33.1%, 33.5% & 29.2) accounted mostly for the causes of ocular morbidities among these workers. Other possible causes of ocular morbidities were fumes/gases, unfavorable temperature conditions, etc.

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Conclusion: Pterygium, pinguecula and allergic conjunctivitis were prevalent among workers in the brewing industry. Similarly, exposure to foreign bodies/dust particles, fumes/gases, carelessness/nonchalance by workers, and unfavorable temperature condition were the major causes of ocular morbidities/problems.

Keywords: Ocular morbidities; brewing; brewery workers.

1. INTRODUCTION

Ocular morbidities have been reported to have escalated the issue of visual impairment worldwide. It was estimated that about 285 million people are visually impaired, 39 million are blind, and 246 million have low vision [1]. The major causes of visual impairments include; uncorrected refractive errors 43%, and cataracts 33%. Other causes are glaucoma, age-related macular degeneration (AMD), diabetic retinopathy, trachoma, corneal opacities, injuries, and 18% are undetermined [1]. The vast majority of people affected by visual impairments are found in low and middle-income countries. Nigeria being a developing country is grappled with the issue of visual impairment. About 4.25 million adults aged 40 years in Nigeria are visually impaired or blind [2].

In a study on prevalence and causes of ocular morbidity; ocular morbidity was defined as a spectrum of eye disorders or abnormalities that affects people [3]. Succinctly put; ocular morbidity encompasses any eye condition whether visual impairing or non-visual impairing conditions affecting the activities of daily life [4]. The North West region of Nigeria accounts for 28.6% of people with one form of visual impairment or another [2]. A study conducted in Aligarh India, revealed that cataract (27.1%) was the common cause of ocular morbidity [5]. A congruent study found that the leading cause of ocular morbidity were conditions that affected the lens 32.6% and the conjunctiva 31.3 [3].

The brewery industry is a global business consisting of several dominant multinational companies and many thousands of smaller producers ranging from brewpubs to regional breweries in Nigeria. The beer brewing industry has become an immensely important segment of Nigeria's manufacturing sector. The process of making beer is known as brewing. Beer is produced by fermenting boiled malt wort and hops [6]. This process leads to an end product known as ethanol and carbon dioxide. Beer production can lead to various eye morbidities or

problems to brewery workers, which are preventable. Thus, adhering to safety measures is tantamount to reducing the risk of ocular morbidities. Safety measures are activities and precautions taken to improve safety, thereby reducing risks related to human health [7]. The working environments of the brewing workers are hazardous; therefore adequate safety measures should be provided for the worker such as the use of personal protective equipment by the workers. According to the Council Directive 89/656/EEC of 30th November 1989 on the minimum Health and Safety requirements, personal protective equipment is designed to protect workers against hazards encountered at work [8]. Personal protective equipment (PPE) refers to protective clothing designed to protect people, especially frontline workers, from injury [9] PPE reduces employee's exposure to hazards when safety controls are not completely effective [10]. Moreover, non-compliance, ignorance, and illiteracy on the part of the workers have exposed them to occupational hazards related to the visual system. The brewery is fast expanding all over the world and the process of beer production and working conditions could predispose these workers to various ocular morbidity which could be avoided. In the context of this study, three (3) brewing industries were selected. They include; Nigeria Breweries Plc., Guinness Brewery, and Intafact Beverages Limited, Subsidiary of SABMiller.

So far, little attention has been paid to the ocular problems experienced by workers in the brewery industries in Nigeria. Understanding the prevalent eye morbidities among these workers would help to inform the management, facilitate and improve the working conditions, safety guidelines of the brewery industries as well as mitigate these avoidable causes of visual impairments.

1.1 Aim of the Study

This study is set to determine the prevalent ocular morbidity affecting workers in the brewery and as well as the causes of these morbidities.

2. MATERIALS AND METHODS

2.1 Research Design and Data Collection

The study is a cross-sectional study. This research was conducted for a period of four months, April 2015 - June 2015. The research team comprised of 6 people: 4 optometrists and 2 non-health personnel. Questionnaires and oral interviews were used to collect data. All participants underwent an eye examination using Snellen visual acuity chart, pen torch, trial lens, ophthalmoscope, retinoscope, etc. The participants were asked if they had experienced any problem with their eyes in the last three months. Those that indicated were asked to elaborate on the measures they applied and the barriers they experienced in seeking eye care.

2.2 Research/Study Area

The study was carried out in three different geographical locations where breweries were situated in Nigeria. The brewery industries included in this study were as follows; Inta-fact Beverages (SABMILLER) located (in Onitsha, Anambra state), Nigeria Breweries (Enugu state), and Guinness Breweries (located in Ikeja, Lagos state). Since the establishment of these breweries, the Non-Governmental Organizations have indicated the importance of eye safety through their medical centers to educate the workers.

2.3 Research Population

The target population was workers in the brewing industry aforementioned above. Taro Yamene's (1967) formula was used to derive the sample size of the population of workers. The formula is stated below.

$$n = \frac{N}{1 + N(e)^2}$$

Where

n= the sample size

N= the population size

E=level of significance or margin of error

Using the formula above, the study was carried out on 400 subjects within the age range of 20-40, randomly selected. These research participants consist of 279 males and 121 females.

2.4 Data Analysis

The data collected were analyzed manually and no statistical software package was used in the analysis. Descriptive statistics were employed to present simple frequencies of the dependent variable and their distribution by sex, age. The frequencies were also presented in bar charts and pie chart.

2.5 Ethical Consideration

The study was approved by the School of Optometry, Abia state University, Uturu. Letters were written and sent to the various breweries for consent and approval. Furthermore, Informed consent was sort and reiterated from the research participants. Research participants with ocular disorders were counseled, treated, or referred to an eye clinic.

3. RESULTS

Overall; 400 participants comprising of 279 males and 121 females were enrolled in this study. Table 1 show that; in Nigerian breweries, 33.3% of the participants were males while 26.4% were females. Similarly, at Guinness, 30.8% were male while 36.4% were females. Furthermore, 35% of the participants were males while 45% were female at INTA-FACT beverages.

Table 1. Distribution of workers of Nigeria breweries, guinness breweries and INTA-FACT beverages (male= 279 and female =121)

Name(s) of brewery	Male (no)	Male (%)	Female(no)	Female (%)
Nigeria breweries	93	33.3	32	26.4
Guinness breweries	86	30.8	44	36.4
INTA-FACT beverages SABMILLER	100	35.8	45	37.2
	279	100	121	00

Table 2a; depicts that 30% of the workers had pterygium, followed by Pinguecula which accounted for 21.5%, allergic conjunctivitis 18.5%, ocular burns 10.8%, cataract 6.2%, lid laceration 3.9% while 9.2% had no ocular condition

Table 2a. Distribution of ocular morbidity/problems in Guinness breweries

Ocular problems/morbidity	Frequency (f)	Frequency (%)
Burns	14	10.8
Pterygium	39	30
Pinguecula	28	21.5
Lid Laceration	5	3.9
Allergic conjunctivitis	24	18.5
Cataract	8	6.2
No ocular condition	12	9.2

Table 2b, shows that dust particles accounted for the highest percentage frequency (33.1%), followed by fumes/gases (20.7%), unfavorable temperature condition (16.5%), unprotected machine parts/PPE (12.5%), carelessness/nonchalance (9.1%), chemicals (8.3%).

Table 2b. Distribution of causes of ocular morbidity/problems at Guinness breweries

Causes of ocular injuries	Frequency	Frequency (%)
Foreign bodies/dust particles	40	33.1
Unprotected machine	15	12.5
Fumes/Gases	25	20.7
Chemicals	10	8.3
Carelessness	11	9.1
Unfavorable temperature conditions	20	16.5

Table 3a shows that Pterygium had the highest frequency (24.8%), followed by Pinguecula (23.2%), allergic conjunctivitis had (13.6%) lid laceration (8.8%) cataract (11.26) while burns had (5.6%) then no ocular condition had (12.8%).

Table 3b shows that dust particles/foreign bodies (33.5%) were the most common cause of ocular problems in Nigerian Brewery. Fumes/gases accounted for (19.6%), unfavorable condition (15.6%), carelessness/nonchalance (11.2%), while unprotected machine parts and chemicals had about (10.1%) respectively.

Table 3a. Distribution of ocular morbidity/problems of workers of Nigerian breweries

Ocular Injury	Frequency (f)	Frequency (%)
Burns	7	5.6
Pterygium	31	24.8
Pinguecula	29	23.2
Lid laceration	11	8.8
Allergic conjunctivitis	17	13.6
Cataract	14	11.2
No ocular condition	16	12.8

Table 3b. Frequency distribution of causes of ocular morbidity/problems of worker of Nigeria breweries

Causes of ocular morbidity/problems	Frequency	Frequency (%)
Foreign bodies/ dust particles	60	33.5
Unprotected machine parts	18	10.1
Fumes/Gases	35	19.6
Chemicals	18	10.1
Carelessness/nonchalance	20	11.2
Unfavorable temperature condition	28	15.6

The Table 4a shows 27.6% of workers had no condition. 24.1% of workers had Pterygium followed by Pinguecula (17.9%) lid laceration had (12.4%) allergic conjunctivitis (7.6%) cataract had (6.2%) burns had (4.1%)

Table 4a. Distribution of all ocular morbidities of workers in Inta-fact beverages limited (subsidiary of SABMILLER)

Ocular Injury	Frequency	Frequency (%)
Burns	6	4.1
Pterygium	35	24.1
Pinguecula	26	17.9
Cataract	9	6.2
Lid Laceration	18	12.4
Allergic conjunctivitis	11	7.6
No ocular condition	40	27.6

Table 4b; shows that foreign body/dust particles had the highest percentage frequency (29.2%) while carelessness/nonchalance had (18.3%). 16.7% of the causes of ocular morbidity were due to unfavorable temperature conditions. Exposure to chemicals accounted for (14.2%) while fumes/gases (13.3%) and unprotected machine parts had (8.3%) respectively.

Table 4b. Distribution of causes of ocular morbidity/problems workers at Intra-fact beverages limited (subsidiary of sabmiller)

Causes of ocular injuries	Frequency	Frequency (%)
Foreign bodies/dust particles	35	29.2
Unprotected machine	10	8.3
Fumes/Gases	16	13.3
Chemicals	17	14.2
Carelessness	22	18.3
Unfavorable temperature conditions	20	16.7

4. DISCUSSION

Overall, a total of 400 workers participated in this study. In Nigeria breweries, 93 males and 32 females with a mean age of 35.9 ± 10.9 years were enrolled while in Guinness breweries about 86 males and 44 females with a mean age of 35.6 ± 10.29 years participated. Similarly, in SABMILLER, about 100 males and 45 females with a mean age of 39.2 ± 11.3 years were recruited. Thus, the total of mean age of the industrial workers was 35.5 ± 10.5 years.

Tables 2a, 3a, and 4a revealed that pterygium was the highest prevalent ocular morbidity or problem among workers in the brewery industry. This could partly be explained by the nature of the working environment, exposure to dust particles, and unfavorable temperature conditions during the brewing process. This finding was in line with the study conducted by [11] where there was a prevalence of pterygium from cereals (barley) used as one of the raw materials in the brewing process of beer production, which irritates when exposed to the eyes.

Correspondingly, pinguecula and allergic conjunctivitis were also prevalent in the aforementioned brewery industries. A possible explanation for this might have been due to exposure to fumes or gases and chemicals used in the brewing process. This may lead to irritation of the eye. Additionally, this finding could be a result of the high occurrence of barley during milling and mashing process [12]. Similarly, another study revealed that the high occurrence of pinguecula was due to the carbonation and pasteurization process involved in the brewing [13].

Furthermore, our findings (Tables 2b, 3b, and 3b) revealed that exposure to dust particles or foreign bodies; fumes or gases as well as

unfavorable temperature conditions were the major causes of ocular problems among brewery workers. Interestingly, nonchalance or carelessness and exposure to fumes contributed also to the ocular morbidity/problems among workers of Intra-fact beverages limited (a subsidiary of SABMiller). Some of the limitations encountered in this study were time constraints and schedule of workers. The workers were mostly busy during their duty hours, especially during the day. Another challenge experienced shift was the duty system, The low literacy level of some of the workers could have contributed to the unreliability of some information they gave as answers in the questionnaire, Furthermore, some of the workers were reluctant and nonchalant in completing the questionnaire while other was afraid of answering questions.

5. CONCLUSION AND RECOMMENDATIONS

This study investigated the prevalent ocular problems among workers in the brewery industry. The findings revealed that pterygium, pinguecula, and allergic conjunctivitis were prevalent among workers in the brewery industry. Similarly, it was found that exposure to foreign bodies/dust particles, fumes/gases, carelessness, or nonchalance by workers and unfavorable condition were the major causes of ocular morbidities/problems among brewery workers in Nigeria. For better productivity, the visual mechanism of a worker should be effective. Therefore we recommend that; strict adherence and enforcement of the safety measures and procedures by the management of these companies, provision of personal protective equipment and compliance by workers, and continuous enlightenment/safety programme to educate the workers on the general health, hygiene, causes of eye problems and way of preventing them.

CONSENT

The research participants' informed, and written consent was sought to ensure maximum cooperation in addition to approval by the management.

ETHICAL APPROVAL

As per international standards, written ethical permission has been collected and preserved by authors. All authors read and approved the final manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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