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PREVALENCE OF EYE DISEASES AMONG WELDERS IN ONITSHA, NIGERIA

Authors:
Ezebilie, C. O.[1], Nwosu, S. N.N.[1,2], Uba-Obiano, C.U.[1,2] , Onyiaorah, A.A.[1,2], Ezenwa, A. C.[1,2], Okpala, N. E.[1,2]

Author Affiliations:
[1]Centre for Eye Health Research and Training, Nnamdi Azikiwe University, Awka, Nigeria
[2]Department of Ophthalmology, Nnamdi Azikiwe University, Awka, Nigeria

***Corresponding Author:**
Prof SNN Nwosu
sabenwosu@gmail.com
ORCHID No. 0000-0001-6495-9227

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ABSTRACT

Background: Welders are prone to radiation, mechanical and chemical eye injuries which could cause visual loss. Information on the prevalence of ocular disorders among welders is essential for planning eye care services.

Aim: To determine the prevalence of eye diseases among welders in Onitsha, Nigeria.

Materials and Methods: Eligible welders at Bridge Head Market Onitsha, selected by simple random sampling, had ophthalmic assessment using a pre-tested questionnaire, visual acuity assessment, external eye examination, refraction, and ophthalmoscopy.

Results: Two hundred and five adult male welders, aged 18 – 70 years, median - 42 years, were studied. Job experience was 6 months - 35 years, median - 15 years; 70 (34.1%) participants were married.

All the participants complained of having had at least one eye disease symptom; light sensitivity, 80 (39.0%), and ocular pains, 62 (30.2%) were the commonest symptoms. Ninety four (45.9%) were diagnosed with ocular disorders; allergic conjunctivitis, 40 (42.5%) and pterygium, 24 (25.5%), ametropia, 12 (12.8%), were the commonest disorders. No participant was bilaterally blind but 13 (6.3%) had monocular blindness caused by corneal opacity, 6 (2.9%), cataract, 4 (2.0%), glaucoma, 2 (1.0), and pterygium, 1 (0.5%). Twenty-nine (14.1%) had moderate low vision and 30 (14.6%), severe low vision in the better eyes.

Conclusion: The prevalence of eye diseases, low vision and monocular blindness among the welders are high but the causes are avoidable. Eye health education for welders is recommended.

Key words: welders, eye diseases, prevalence

INTRODUCTION

The Nigeria National Blindness and Visual Impairment Study[1] had reported the prevalence and causes of blindness nationwide. Earlier on, both hospital-based[2] and population-based[3] studies had documented the burden of visual loss in Anambra State. However, none of these studies focused on welders. It is known that certain occupations, of which welding is one, are at increased risk of ocular disorders as part of occupational hazard[4,5].

Welding is an occupation in which workers are predisposed to eye diseases via exposure to thermal radiation as well as mechanical and chemical injuries. The ensuing ocular disorders include anterior segment inflammation such as conjunctivitis and photokeratitis[4] as well as degenerative changes including pingueculum and pterygium[5]; the welder's arc light could damage the retina leading to irreversible visual loss[6].

However, the prevalence of eye diseases among welders in Anambra State is unknown. The need to fill this gap in knowledge is not in doubt. Therefore, to solve this unmet need, we embarked on a survey of eye diseases and their causes among welders in Onitsha Nigeria. This article presents the prevalence of eye diseases among welders at the Bridge Head Market, Onitsha, Nigeria.

MATERIALS AND METHODS

This cross-sectional study of welders at the Bridge Head Market, Onitsha, was conducted between August and October 2024. Approval for this study was obtained from the Anambra State Ministry of Health Ethics Committee. Permission was also obtained from the leadership of the welders union; the consent of each participant was equally obtained.

Using the Leslie Kish formula with an adjustment for population <10000[8], a minimum sample size of 186 was calculated at 95% confidence interval. However, allowance was made for 10% attrition thus bringing the sample size to 205. Welders aged ≥18 years who willingly consented to participate in the study were enrolled. Welders who did not give consent or who were absent during the study period or who were too ill to participate were excluded.

Simple random sampling technique was used to select participants as follows: from the register of the welder's union, the names of the welders were extracted and written on a 2cm by 2cm piece of paper and each folded. The folded papers were put in a bag and mixed several times. An assistant not involved with writing names and folding papers picked out the folded papers until the calculated sample size was attained. The selected papers were then unfolded and the workers whose names appeared on the papers constituted the study subjects.

The tools used for the study comprised a pre-tested questionnaire on the participants' socio-demographic characteristics, eye disease symptoms and eye health-seeking behaviour. The questionnaire and the ophthalmic insturments used for the study were pre-tested among welders in Oba, more than 10 kilometres away from the study site. Ocular examination was included visual acuity measurement with the Snellen chart, pen-torch examination of the ocular adnexa and the anterior segment, refraction and direct ophthalmoscopy. The study team comprised ophthalmologists and ophthalmic nurses.

In this study, ocular diagnosis was recorded in terms of persons and not in terms of eyes; where more than one lesion co-existed, the one likely to have caused visual loss was taken as the diagnosis. For instance in a participant having glaucoma and refractive error, glaucoma is taken as the main diagnosis. Blindness was defined as visual acuity <3/60 and low vision as acuity of <6/18 – 3/60. Data obtained were analysed using descriptive statistics.

RESULTS

A total of 205 welders participated in the study. All the participants were males with age range of 18 – 70 years and a median of 42 years; the 31 -50 age bracket constituted 99 (48.2%). Table 1 shows the age distribution of the participants. While 70 (34.1%) participants were married, no participant was divorced or separated. The job experience was 6 months to 35 years with a median of 15 years. Although all the participants knew that use of protective eye wear during welding would minimize eye disorders, not many participants consistently used the protective eye wear. Reasons for non-use included on-availability and visual blurring during use. The relationship between use of protective eye wear and the incidence of eye diseases among this cohort of welders is the subject of another article.

In Table 2 is shown the self-reported eye disease symptoms. While all the participants complained of having had at least one eye disease symptom, some complained of multiple symptoms. Light sensitivity, 80 (39.0%), and ocular pains, 62 (30.2%) were the commonest symptoms reported, constituting more than two-thirds of the complaints.

Table 3 shows the ocular diagnosis. Of the 205 participants, 94 had ocular disorders thus giving a prevalence of 45.9% among this cohort of welders. Allergic conjunctivitis, 40 (42.5%) and pterygium, 24 (25.5%), and ametropia (refractive errors), 12 (12.8%) were the commonest disorders. None of the participants with refractive errors had optical aids; of these ametropic participants, 5 also had uncorrected presbyopia. The degree of ametropia was ±0.50 - ±3.00 dioptres.

Table shows the presenting visual acuity in both the better and worse eyes of the participants. No participant was blind in the better eye but 13 (6.3%) were blind in one eye only i.e. 6.3% prevalence of uniocular blindness. The causes of uniocular blindness were corneal opacity, 6 (2.9%), cataract, 4 (2.0%), glaucoma, 2 (1.0), and pterygium, 1 (0.5%). All the cases of corneal opacity were due to ocular trauma. With regard to low vision, 29 (14.1%) had moderate low vision (acuity 6/24 – 6/60) and 30 (14.6%) severe low vision (acuity <6/60 – 3/60) in the better eyes; similarly moderate, 47 (22.9%) and severe low vision, 35 (17.1%) were also recorded in the worse eyes of the participants.

Table 1: Age distribution

Age (years)	No.	%
≤20	21	10.2
21 – 30	38	18.5
31 – 40	41	20.0
41 – 50	58	28.4
51 – 60	26	12.7
61 – 70	21	10.2
Total	205	100.0

Table 2: Self-reported eye disease symptoms*

Symptom	No.	%
Light sensitivity	80	39.0
Ocular pain	62	30.2
Tearing	40	19.5
Redness	30	14.6
Sandy sensation	18	8.8
Blurred vision	16	7.8

*% based on 205

Table 3: Ocular diagnosis

Disorder	No.	%
Allergic conjunctivitis	40	42.5
Pterygium	24	25.5
Refractive error	12	12.8
Corneal opacity	8	8.5
Cataract	6	6.4
Glaucoma	4	4.3
Total	94	100.0

Table 4: Presenting visual acuity

Visual acuity (Snellen)	Better eye (%)	Worse eye (%)
6/4 – 6/9	110 (53.7)	60 (29.3)
6/12 – 6/18	36 (17.6)	50 (24.4)
6/24 – 6/60	29 (14.1)	47 (22.9)
<6/60 - 3/60	30 (14.6)	35 (17.1)
<3/60 – LP*	0 (0.0)	13 (6.3)
Total	205 (100.0)	205 (100.0)

*LP = light perception

DISCUSSION

Although a nationwide blindness and visual impairment survey had been conducted in Nigeria[1], problems peculiar to some occupational group are yet to be specifically addressed. Thus, an ophthalmic survey of welders is essential as their peculiar needs relative to their occupation were not particularly captured in the national blindness and visual impairment study.

The 45.9% prevalence of eye diseases recorded in the present study points at the huge burden of ocular ailments among the welders. A similarly high prevalence was recorded by Ajayi and Omotoye[5] in Ile-Ife, southwest Nigeria and Atakunda et al[8] in Uganda. Although none of the participants was bilaterally blind, the 6.3% prevalence of uniocular blindness is more than 6-fold the blindness rate within the general population[1]. Of great importance is that welding requires good stereopsis. Thus a monocular welder is prone to poor judgement of depth with attendant loss of precision when joining metals; loss of stereo-acuity also increases the tendency to work-related injuries.

Eye injuries constitute a common cause of ocular morbidity among welders[9]. While the present study did not primarily focus on ocular trauma, the finding that nearly half of the uniocular blindness were due to trauma-related corneal opacity supports the preponderance of eye injuries as cause of visual loss among welders. But work-related eye injuries are preventable if the welders use protective eye wear (goggles) during welding.

While cataract and glaucoma are common causes of visual impairment and blindness in Nigeria, they are treatable especially if the afflicted seeks help early. But late presentation to hospital had been reported as being common among ophthalmic patients in Onitsha Nigeria[10]. The finding that pterygium counted among the causes of blindness among the participants is an important indicator of the very poor state of eye health among welders. Although pterygium as a cause of blindness had been previously documented in some Nigerian communities, these were often among the underserved rural communities[11,12]. But the present study was conducted among urban dwellers. Onitsha is the foremost urban city in Anambra State with a tertiary public eye hospital that offers optical, medical, surgical and preventive ophthalmic services. However, none of the participants had accessed eye care in this hospital. Thus, urban habitation alone may not be a panacea to prevention of avoidable blindness.

Lack of awareness, cost of treatment and location of healthcare facilities are among the factors that may cause visual loss even among urban dwellers. Therefore, while the known barriers should be addressed, an aggressive eye health education programme should be instituted for the welders and all artisans in order to reduce the incidence and prevalence of avoidable blindness among these occupational groups.

Allergic conjunctivitis was the commonest disorder among the participants. While not a cause of visual loss, allergic conjunctivitis causes distressing symptoms including persistent itching, increased lacrimation (tearing) and redness of the eyes. Some of these symptoms may keep the afflicted off duty and this will, in turn, negatively impact productivity.

Similarly, uncorrected refractive errors including presbyopia were common. This is not surprising for a population that sparingly accessed eye care. Akin to what had been documented in previously[13], the degree of ametropia among the participants were of low to moderate degrees. However, it is conceivable that correction of ametropia among welders would enhance their efficiency.

Given that welders are usually exposed to radiant energy from the arc light, it was expected that many participants would have had dry eyes. But no case of diagnosis of dry eye disease was made in this study. This was because the tools for definitive diagnosis of dry eye disease were not employed in the present study. Therefore, the apparent absence of dry eye disease among the participants should be interpreted with caution.

In conclusion, our study has documented a high prevalence of eye diseases and low vision among the welders studied. While no participant was bilaterally blind, there was a high rate of monocular blindness. The causes of the eye diseases and visual impairment are avoidable in the sense that they either preventable or treatable. Therefore, frequent eye health education is recommended to enable the welders and indeed all artisans achieve and maintain optimal eye health.

REFERENCES

1. Kyari F, Gudlavalleti MV, Sivsubramaniam S, Gilbert CE, Adull MM, Entekume G, Foster A. Prevalence and visual impairment in Nigeria: The Nigeria National Blindness and Visual Impairment Study. Invest Ophthalmol Vis Sci 2009; 50: 2033 – 9.

2. Nwosu SNN. Blindness and visual impairment in Anambra State, Nigeria. Trop Geogr Med 1994; 46(6): 346 - 349.

3. Nwosu SNN. Ocular problems of young adults in rural Nigeria. International Ophthalmology 1998; 22: 259-263.

4. Ihekaire DE, Oji CS. Corneal injuries associated with ocular hazards in welding industry: A case study of Nekede mechanic village, Imo State. Int J Ophthalmol Vis Sci 2017; 2(2): 37 – 54.

5. Ajayi IA, Omotoye AJ. Pattern of eye diseases among welders in a Nigerian community. African Health Sciences 2016; 12(2): 2010 – 6.

6. Hitoshi N, Akihiro U, Jyunaya T, Nobuyuki F, Tsutomu O. Hazard of ultraviolet radiation emitted in gas metal arc welding of mild steel. Journal of Occupational Health 2016; 58(5): 452 – 9.

7. Araoye MO. Research methodology with statistics for health and social sciences. Ilorin: Nathadex Publishers 2004:119.

8. Atukunda I, Rebecca CL, Samia HA, Mukisa J, Otiti-Sengeri J, Ateenyi-Agaba C. Prevalence, pattern and factors associated with eye disorders in small scale welders in Katwe, Kampala. BMC Ophthalmol 2019; 19: 145. https//www. Doi.org/10.1186/s1288-019-1150-x.

9. Fiebai , Awoyesuku EA. Ocular injuries among industrial welders in Port Harcourt, Nigeria. Clin Ophthalmol 2017; 5: 1261 – 3.
10. Nwosu SNN. Domestic ocular and adnexal injuries in Nigerians. *West Afr J Med* 1995; 14(3): 33 - 5.

11. Nwosu SNN. Low vision in persons aged 50 years and above in the onchocercal endemic communities of Anambra State, Nigeria. *West Afr J Med* 2000; 19(3):216-9.

12. Adeoti CO, Adejumo OO. Severe visual impairing in ten adult eyes in Osun State, Nigeria. Research Journal of Health Sciences 2024; 12(2): 157 – 62.

13. Nwosu SNN. Ametropia in Onitsha, Nigeria. *Niger J Ophthalmol* 1997; 5: 21 - 24.