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Research Article

PREVALENCE OF OCULAR MORBIDITY AMONGST INDUSTRIAL WORKERS IN GOA, INDIA

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ABSTRACT

Objective: To study the prevalence and nature of ocular morbidity amongst the industrial workers in select industries in Goa.
Material and methods: Three industries were purposefully chosen for the study. The industries studied were: a chemical and fertilizer industry; a ship building industry and a rubber tyres manufacturing industry. The total worker strength at the selected three industries of 2886 was the study population for this study. The study was conducted 'on site' through a mobile eye care unit. Each worker was subjected to thorough ophthalmic evaluation. Data was entered in predesigned format and analysed using SPSS software.
Results: The overall prevalence of ocular morbidity was 32.1% among the workers in the three industries. The prevalence of acute industrial eye trauma was 2.2%. The highest prevalence of ocular injury was in ship building industry at 2.7% followed by rubber industry (2.3%) while it was lowest in chemical industry (1.3%). Around 62.5% of ocular injuries occurred because the workers failed to use safety eyewear provided by the company. The combined prevalence of conjunctival melanosis, pterygium, pingecula and chronic conjunctivitis was found to be 7.2% among all the workers.
Conclusion: Almost all of occupational eye disorders are more easily prevented than treated. Several preventive measures are now available. With such preventive measures readily available both employers and employees must work aggressively to decrease the number of workers affected with an occupational eye disorders.

INTRODUCTION

Occupational eye disorders represent a complex group of traumatic injuries, harmful exposures, uncorrected and undiagnosed ocular diseases, eyestrain and fatigue, and other miscellaneous ocular complaints (Goldsmith *et al.,* 2007). Industrial work environment has introduced a new set of ocular and visual complaints and disorders. The effect on the individual who loses vision in a work accident is devastating, the astounding truth, however, is that essentially all work related eye injuries are preventable (Goldsmith *et al.,* 2007). It is estimated that 90% of all ocular injuries are preventable (NSPB, 1990). Industrial ophthalmology has tremendous relevance and socioeconomic significance, yet since its recognition as a distinct entity it has not witnessed significant progress nor has it been accorded due recognition. Hence with a view to understanding the prevalence and nature of ocular morbidity amongst the industrial workers in Goa the current study was conducted in select industries in the state of Goa, India.

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MATERIALS AND METHODS

The present study was conducted in two phases. The preliminary phase involved a screening survey of all industrial workers in the state by an ophthalmic assistant with paramedical staff using titmus vision testing machine. The main phase consisted of detailed ophthalmological evaluation of a subset of all industrial workers. However due to technical limitations of titmus screening test and lack of clinical expertise among paramedical staff the pilot study could not identify industries having high ocular morbidity among its workers. Hence in the main study all workers in three major industries in Goa were included. These three industries were purposefully chosen to represent population of workers exposed to variety of occupational hazards ranging from toxic chemicals to mechanical hazards. The three industries chosen were: Zuari Agro Chemicals, a chemical and fertilizer industry; Goa Shipyard Ltd, a ship building industry; MRF Ltd, a rubber tyres manufacturing industry. Minimum sample size required was initially calculated using the formula $N=4pq/l^2$ wherein the prevalence of ocular morbidity (p) was assumed to be 10% and allowable error (l) was set at 10% of p.

The sample size was calculated at 3600; however the total worker strength at the selected three industries was only 2886 hence to avoid logistical difficulties it was decided set the total worker strength of 2886 as the sample size for this study. The study was conducted 'on site' through a mobile eye care unit of the National Programme for Control of Blindness. The study team consisted of two ophthalmologists, one ophthalmic assistant, one nurse and other supporting staff. Each worker was subjected to thorough ophthalmic evaluation which included ophthalmic history, exposure to occupational hazards and detailed ophthalmic evaluation. Data was entered in predesigned format and analysed using SPSS software.

RESULTS AND DISCUSSION

Majority of the workers (46.2%) were in the age group of 31-40 years, 25.5% were between 41-50 years of age, 20-30years age group constituted 22.4% of the study population while 5.9% of the workers were above 50 years of age. Given the nature of the industries studied female workers were minimal in number. Only 23 women were employed in these three industries constituting 0.8% of the study population. Around 809 (28%) workers were from chemical and fertilizer industry, 1056 (36.6%) were from shipbuilding industry and the remaining 1021 (35.4%) were from the rubber tyres manufacturing industry constituting the total study population of 2886 workers. The overall prevalence of ocular morbidity was 32.1% among the workers in the three industries. The prevalence was 34.6% in chemical and fertilizer industry, 37.6% in shipbuilding industry and lowest of 24.3% in rubber industry Table 1.

The highest prevalence of ocular injury was in ship building industry at 2.7% followed by rubber industry (2.3%) while it was lowest in chemical industry (1.3%). This finding could possibly be attributed to potentially hazardous mechanical processes in ship building industry. Titiyal *et al.* (1998) (Titiyal and Murthy, 1998) reported industrial ocular injury prevalence of 10% in their study in six industrial establishments in North India while Islam *et al.* (2000) reported ocular injury incidence rate of 168.3 per 100,000 employees. Out of the 64 cases of ocular injury 62.5% occurred because the workers failed to use safety eye wear provided by the company, 18.7% occurred due to removal of eye gear between work, 12.5% ocular injuries could be attributed to eyewear inappropriate for the activity, while 6.2% occurred due to non provision safety eyewear by the company. Titiyal *et al.* (1998) (Titiyal and Murthy, 1998) reported that only 3.6% of the floor workers were using protective devices while on the job while a study in a major US automobile corporation only 25% of workers were found to be using eye protection at the time of injury (Wong *et al*., 1998). The combined prevalence of conjunctival melanosis, pterygium, pingecula and chronic conjunctivitis was found to be 7.2% among all the workers. The highest prevalence was in chemical industry (10.5%) while it was 7.1% and 4.9% in rubber and ship building industry respectively. Table 1. Higher prevalence in chemical industry could probably be attributed to harmful effects of chemicals in form of fumes, vapours and dust in the chemical and fertilizer industry. Omoti *et al.* (2008) (Omoti *et al*., 2008) in their study in petroleum industry reported that workers exposed to irritant chemicals were more prone to

Table 1. Distribution of ocular morbidity among industrial workers in Goa, India

Morbidity	Chemical industry N=809	Ship Building industry N=1056	Rubber tyres industry N=1021	Total N=2886
All morbidities	280 (34.6%)	398 (37.6%)	249 (24.3%)	927 (32.1%)
Ocular injury	11 (1.3%)	29 (2.7%)	24 (2.3%)	64 (2.2%)
Conjuctival diseases	85 (10.5%)	52 (4.9%)	72 (7.1%)	209 (7.2%)
Refractive errors	119 (14.7%)	186 (17.6%)	127 (12.4%)	432 (14.9%)

In a study in north India 51% of workers complained of ocular symptoms and the point prevalence of ocular morbidity was found to be 746.03/1000 industrial workers (Titiyal and Murthy, 1998). Islam *et al.,* 2000 reported annual incidence rate of 537 per 100,000 employees for work related compensable ocular illnesses (Islam *et al*., 2000). As far as visual acuity was concerned 66.3% of the workers had uncorrected visual acuity of 6/9 or better while 4.1% had corrected visual acuity of 6/18 to 6/60 and falling in Category I of WHO classification of visual impairment. About 14.9% of workers were found to have a refractive error. Refractive errors though a cause of ocular morbidity were non occupational in etiology but are important as they cause visual impairment leading to lower work efficiency and accidents. The prevalence of refractory error in chemical industry was 14.7%, in shipbuilding industry it was 17.6% while in rubber industry it was 12.4%. In a study among industrial workers in southeastern Nigeria (Okoye and Umeh, 2002) the prevalence of refractive errors was found to be 26.2%. Table 1. The prevalence of acute industrial eye trauma which includes injury to the lids and adnexa, ocular concussion injury, blast injury, perforating eye injury, Intraocular foreign body, corneal foreign body, traumatic cataract and arc eye was 2.2%. Table 1.

allergic conjunctivitis, pterygium and corneal abrasion while (Bulbulia *et al.,*1995) in their study among chemical industrial workers found that 40% of the ocular diseases were attributable to occupational exposure to chemicals. There were 88 cases (3.3%) of defective colour vision, in almost 40% of these cases the defective colour vision compromised work efficiency and was a potential source of work accidents surprisingly in none of these cases pre-employment assessment of colour vision was done.

Conclusion

Almost all of occupational eye disorders are more easily prevented than treated. Several preventive measures are now available. With such preventive measures readily available both employers and employees must work aggressively to decrease the number of workers affected with occupational eye disorder.

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