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Abstract

Purpose: 7 R G H W H U P L Q H W K H S U R i O H R I S U H V H Q W L Q J Y L V X D O V W D W X V D Q G U H I U D
ers at the Ambattur Industrial estate, Chennai.

Methods: A descriptive study was conducted in the small scale and tiny sector industries in Ambattur Industrial estate, Chennai. Hundred and eleven (111) workers were conveniently sampled for the study. Information on their demographic data, was collected, all participants underwent ophthalmic examination which include, visual acuity for distance and near, objective and subjective refraction if their visual acuity is less than normal, colour vision and torch light examination.

Results: Hundred and eleven small scale industry workers were screened which included 24.3% Entrepreneurs, 14.4% Operators, 14.4% engineers includes both electrical and chemical engineers, 11.7% administrators, 7.2% welders, 10.8 % turners, 9.9% house keepers and 7.2% drivers. Among hundred and eleven workers, 82% were males and 18% were females with a mean age (39.7 ± 8.9 years). 23.4% showed Visual impairment ranging from mild to severe. The most common visual disorders were uncorrected presbyopia (37%), uncorrected refractive error (36.93%), Colour vision defect was found in (10.8%) and cataract in (6.3%). None of them used protective eye wears.

Conclusion: Our study recommends that uncorrected presbyopia and uncorrected refractive error was high among workers as they are not aware about eye health and safety measures for the occupation. The use of safety eye devices is low among workers and recommends that process about awareness and implementation of ocular safety in these industries is established.

Keywords: Visual acuity; Refractive error; Presbyopia; Industrial workers

According to WHO, over 1000 million people worldwide are employed in small-scale industries¹ the engineering industry of India is one such industry. It is an unorganized sector, mostly run by private formations. It provides employment chiefly for men mostly from uneducated and poor background.

Introduction

India at present is considered a key power and is revolving into an established country from a rural country; an enormous division of its people still belongs to the poverty line. In emerging countries, great struggles are focused towards the development of small-scale industries as these are considered the engine for their economic growth.

The employees of this industry hardly ever benefit from industrial health-and-safety requirements. As a result their health suffers; studies show diseases of the eye, accidents, injuries, skin diseases, stress, insomnia, etc. e ill health is compounded by various socioeconomic factors such as poverty, lack of education, poor working conditions, excess working hours, and poor diet [7-9]. Ambattur Industrial Estate is a specially nominated industrial area in the Chennai region of Ambattur. Renowned in 1964, the industrial estate stretches across 1,300 acres and is home to over 1,500 small and medium enterprises, focusing largely in automobile components and engineering products.

Our eyes are in continuous usage throughout every waking minute. The method we practice through our eyes is useful to decide in what way we exert during our lifetime. Most of our learning is intervened through our eyes representing that how much important is our vision. Defective vision is quiet challenging which is detected after a long period of continuous exposure to the surroundings.

Uncorrected refractive errors often lead to eye injuries in industrial workers. There is yet neither literature existing in our country on the quantity of visual impairment in industrial workers nor any data to compare eye injuries due to the deprived visual status of the injured.

It is assumed that Incidence of visual disorders in industrial workers may result in visual loss, anguish, reduced manpower, man hours and economic loss. Most of these hazards are preventable if adequate precautionary measures are taken [1-4]. Worker's eyes may be exposed to a variety of dangerous agents depending on the type of industry which may constitute an occupational hazard [5,6]. Most of the reported studies related to non-traumatic ocular disorders that have emerged from developed countries with relatively little information from developing countries such as India. For example, a study carried out in Wolver-Hampton, a highly industrialized area of the United Kingdom showed 73.8% of all ocular trauma over a 10 year period occurred in industries [2]. A similarly higher cure of 71% was reported in an early study conducted in 1923.6 On the other hand, a much lower cure of 15.4% was reported from a relatively less industrialized area of Northern Ireland [3].

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This study is a try to determine the visual and refractive status of industrial workers as the first step to determine the eye care needs of industrial workers and to frame an industrial eye safety program.

Methodology

A descriptive study was conducted in the small scale and tiny sector industries in Ambattur Industrial estate, Chennai. Hundred and eleven (111) workers were participated in the study. In addition to the demographic data, presenting visual acuity was measured using the Snellen's chart for distance placed at six meters with adequate illumination. Each eye was tested separately with and without glasses where applicable and subsequently refracted using retinoscope to rule out refractive error, if their visual acuity was less than normal. The refractive error was further classified into myopia, hyperopia and astigmatism. Near visual acuity was tested using N notation reading chart. Near correction was given to those who have near visual acuity less than N6 to rule out Presbyopia. Presenting visual acuity of 6/9 or worse in the better 'seeing eye' was considered as abnormal. Color vision was tested using the Ishihara pseudo-isochromatic plates and findings noted as normal or abnormal. Torch light examination was done with a pen-torch to rule out any anterior segment abnormalities. All the workers who participated in the vision screening camp were recruited and there are no exclusion criteria for this study. Data analysis was done using the Statistical Package for Social Sciences (SPSS v 16). Descriptive and inferential statistics were used to present the results of the study.

Results

Of the total number of 111 workers 91 (82%) were males and 20 (18%) were females. The workers were aged between 20-69 years with a mean age of (39.7 ± 8.9) years. The workers age were categorized as 20-29 were 21.6%, 30-39 were 25.2%, 40-49 were 34.2%, 50-59 were 13.5% and 60-69 were 5.4%. The majority of the workers were aged between 40-49 (Figure 1). The workers were volunteered from small and tiny sector industries like machine operators 16 (14.4%), Businessmen (24.3%), Operators 16(14.4%) Engineers 16 (14.4%), Administrators (11.7%), welder 8 (7.2%), Turner 12 (10.8%), Housekeeping 11 (9.9%) and drivers 8 (7.2%) (Table 1).

Ocular complaints

Out of 111 workers, 50 (45%) of the workers had no ocular complaint. Headache, watering, irritation was the highest complain in 23 (20.7%) followed by poor near vision in 18 (16.2%). Difficulty in distant vision, difficulty in both near and distant vision recorded as 5.4%, and 12.6% respectively (Figure 2).

Presenting visual acuity (VA)

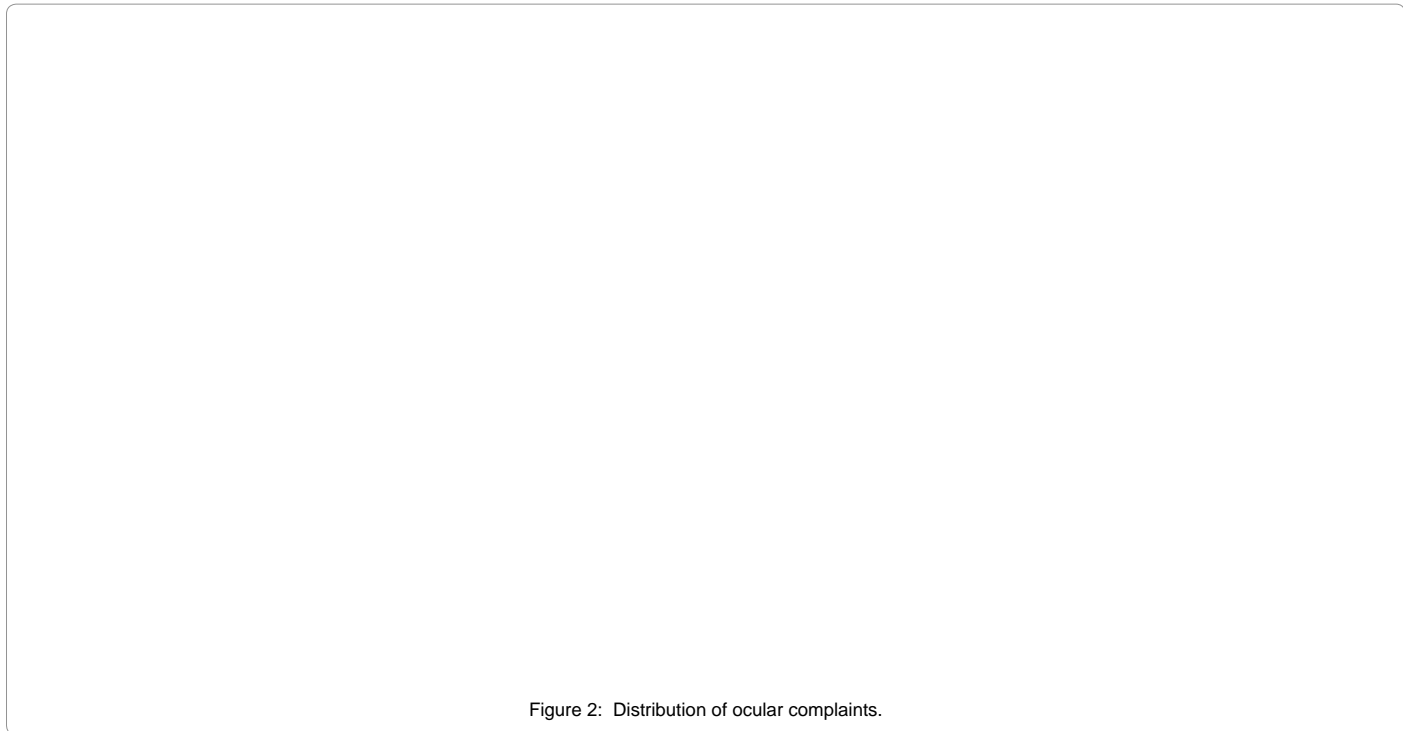
The distribution of presenting VA for each eye is presented in Figure 3). Using the WHO classification, there are 19 individuals (17.1%) who come under a fairly poor distance vision range of 6/9 to 6/12 and 7 workers (6.3%) who have visual acuity ranging from 6/18 to 6/60. The results showed that 85 (76.6%) of the workers had normal visual acuity of 6/6 or better were given in (Figure 4). Seven individuals representing 6.3% were wearing glasses and therefore had their VA taken while wearing their spectacles.

Near visual acuity was also assessed for the respondents since 59 of the 111 workers representing 53.1% were over 40 years of age. Each eye was assessed separately and then together. Of all those assessed, 65 (68.5%) could read the N6 with both eyes. A considerable number of 33 (28.8%) fell between the N8 and N18 lines with both eyes, and 3 individuals read the N24 to N36 lines (Figure 3).

Occupations	Frequency	Percentage
Business	27	24.3
Operator	16	14.4
Engineer	16	14.4
Administrator	13	11.7
Welder	8	7.2
Turner	12	10.8
House keeping	11	9.9
Driver	8	7.2
Total	111	100

Table 1: Distribution of occupation.

Figure 1: Range of age in percentage.



Chi-square test was done to find the statistical significance between each values separately in which the analysis between age, sex, occupation, presenting visual acuity, refractive status and presenting visual acuity showed a statistical significance of colour vision and torch light examination. The significance was $p < 0.003$, also comparison between complaints versus visual acuity and sex.

Figures 4: The distribution of presenting visual impairment in the right and left eye.

versus near visual acuity results were statistically significant with a p value 0.00 and 0.014.

Among 111 individuals who had their colour vision assessed, 99 (89.2%) of them were normal and 12 (10.8%) were abnormal. Out of 12, 5 (4.5%) were machine operators, 1 (0.9%) turner, 3 (2.7%) businessmen and 3 (2.7%) engineers (Figure 5). The significance of colour vision abnormality is not known as the small scale workers were not aware about the defect.

The comparison between age, complaints versus colour vision were statistically significant with a p value of 0.007 and 0.001. Occupations versus colour vision were not statistically significant. The torch light examination distribution is given in (Figure 6).

Refractive status

Out of 111 workers, 36.93% had uncorrected refractive error. The distribution of the presenting refractive error status of each eye (Figures 7 and 8). The refractive errors were classified based on their degree as low, moderate and high. A correction 35.1% have refractive errors with 24.3% hyperopes and 10.8% myopes. Emmetropes were found in 64.9%. Spherical equivalent was taken to find the refractive status (Figure 9). 12.7% showed mild visual loss and 87.3% had normal vision (Figure 10). 59 (53%) of the workers were presbyopic, among them (37%) of them were uncorrected presbyopes who required glasses for near vision (Figure 11). Businessmen and machine operators were the majority of the people who requires glasses.

Discussion

Apart from the domestic environment, the workplace is the set where several people spend a large proportion of their time. This study falls under the monarchy of occupational vision which is concerned with the efficient and safe visual functioning of an individual within the work environment [10]. The small scale industry workers voluntarily participated in the study. The convenient sampling method was used because we had inadequate right to access to the workers so we could manage to assess the visual and refractive status of all the workers who

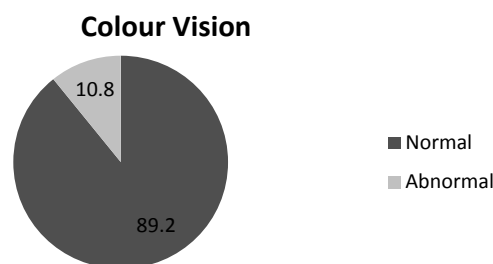


Figure 5: Percentage of colour vision distribution.

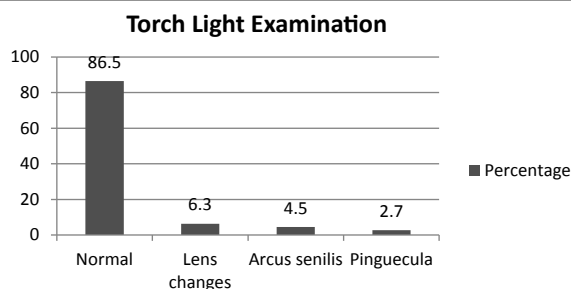


Figure 6: Distribution of Torch light examination among small scale industry workers.

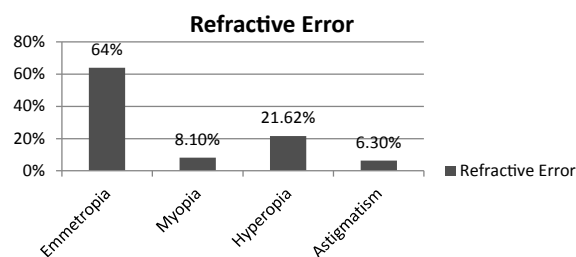
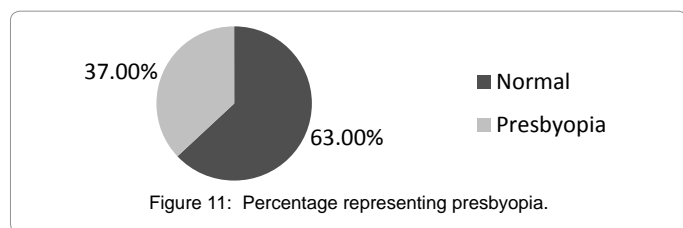
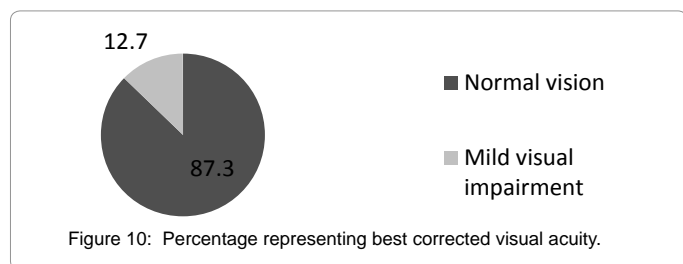
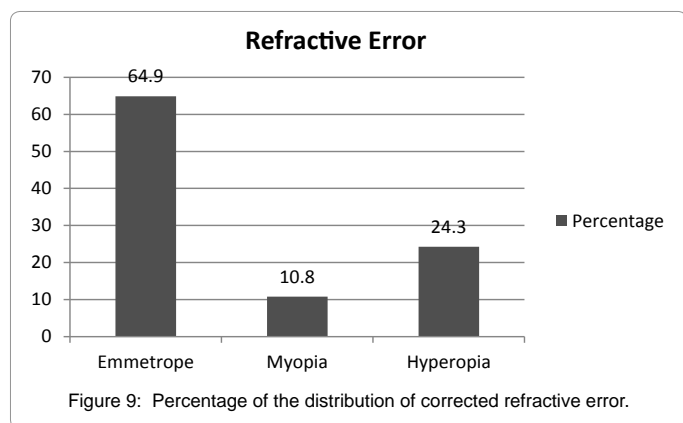
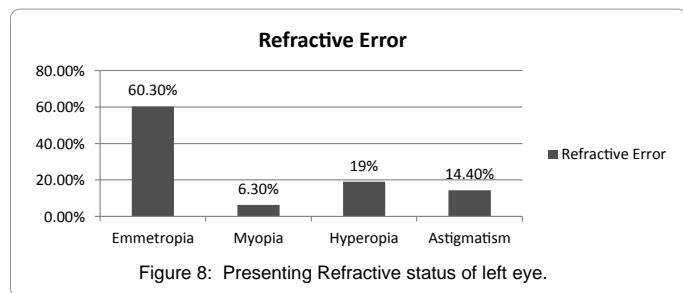


Figure 7: Presenting Refractive status of right eye.



participated in our study at one particular location. Visual examinations were carried out as in previous studies. The results obtained were within the areas of research in other parts of the world. The mean age of workers in the study was 39.7 years. This is higher than that found in related 6 industrial establishments in Saharanpur, India which was 35.2 years, 123.0 ± 6.0 years found in miners in Turkey and 33.4 ± 12.0 years found in the study of occupationally injured workers in Tubingen, Germany.

In this study the majority of the occupations listed were business men, followed by machine operators and engineers. This shows that only the owners of the small scale industries were more interested to undergo visual examination than their employees because of the lack of time in the working environment.

The existing research also supports to create base line data on the

visual status of industrial workers (Figure 3) indicates that by extreme a majority (76.6%) of workers have normal visual acuity. There are 19 individuals (17.1%) who come under a fairly poor vision range of 6/9 to 6/12 and 7 workers (6.3%) who have visual acuity ranging from 6/18 to 6/60 and who come under category 1 of the WHO grades of visual impairment [13] if their vision is left uncorrected. Significant visual impairment was observed in 21.8% individuals and moderate impairment in 34.5% of cases was found by Rajiv Desai et al. [14] in his study conducted in India in the year 1990. The significance between age and presenting visual acuity showed a statistical significance of 0.003, also comparison between complaints versus visual acuity and sex versus near visual acuity results were statistically significant with a p value 0.00 and 0.014.

The occurrence of uncorrected refractive error was 36.93% in this study (only 6.3% wore spectacles for distant correction). This value is much lower than the 56.7% found by Titiyal et al. in six industrial establishments at Saharanpur in India in the year 1998 [11] but higher than the selected industrial establishments (cement factory, mining, saw mill and steel works) in Enugu, Nigeria [4] where only 26.2% was found in that study. This does not prove that uncorrected refractive errors can cause eye diseases in factory workers because our data is too small to represent an industrial workforce of 90.1 million in the country [15] and a further survey to be conducted in the future.

Presbyopia was observed in 53% of the population. 47% of the workers could not read paper prints at 40 cm (presbyopia), yet none of them had their near prescription, hence this had the potential to place the workers at risk of injuring themselves and the fellow workers. Most of the workers reported not wearing their spectacle correction because they were not aware about the near correction requirement and also no readily available eye care service at the tiny sector industries.

Regarding that the none of the workers wear protective glasses were comparable to the study findings by Titiyal and Murthy in India where 96.4% of the workers did not use protective eye devices. The reasons given for not using ocular protective devices were not questioned due to lack of time and hence this can be continued in the future.

The eye diseases observed in this study were common to those found in other industrial establishments in other parts of the world. The occurrence of cataract, arcus senilis and pingueculae were 6.3%, 4.5%, 2.7% respectively (10.8%) were colour vision abnormal who did not report any work related inefficiency. This is because of the screening of vision is not a routine procedure for employment in these industries.

The comparison between age, complaints versus colour vision were statistically significant with a p value of 0.007 and 0.001. Occupations versus colour vision were not statistically significant. We also observed that no similar studies showed a higher percentage in colour vision. This was an unusual finding, in the future we recommend to focus the study on the effect of functioning of industry workers, if they are colour blind.

In recent times, the impact of poor environmental conditions at the workplace, poor awareness of work conditions, and presence of adverse health conditions in workers has received much attention. The environment of workplaces differs and hence the contributing factor of work-related injury and illness also varies; identification of the responsible factors in any specific work environment would help in clarifying the etiology and would also be useful for prevention and containment of the occupation-related ill health.

Conclusions

From this study, we conclude that the presenting visual status of small scale industry workers maintain their safety and that of their fellow workers. Uncorrected refractive error and presbyopia were common among these workers due to the non-availability of eye care services and also they are not aware about eye health and safety measures for the occupation. It is suggested that prior to job placement all workers undergo visual acuity screening and get their refractive errors rectified. We in future suggest that an industrial eye health and safety surveillance system should be recognized to monitor the occurrence of eye diseases and injuries. It should also be tasked to undertake eye risk assessment in such industries to control inevitable work related eye disorders. The use of safety eye devices is low in these workers and suggests that, measures to implement ocular safety should be undertaken in these industries.

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