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Research Article

Ocular Hazards among Woodworkers at Ashaiman Timber Market, Ghana

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Abstract

This research was undertaken to determine ocular hazards encountered by woodworkers at Ashaiman Timber Market.

Purposive and simple random sampling techniques were used to sample 150 woodworkers at Asahiman Timber Market. Collection of data involved examination and interviews.

In assessing woodworkers on their knowledge of ocular hazards, 8 (5.34%) workers had high knowledge of ocular hazards while 116 (77.34%) had low knowledge of ocular hazards. 77 (47.33%) said the devices were not convenient, and 10 (6.67%) said they were not affordable. 61 (40.67%) workers had ocular injuries in the past five years. Results showed that 120 (80%) woodworkers had allergic conjunctivitis, 115 (76.67%) had foreign bodies at least once, 50 (33.3%) had infections, 38 (25.33%) had pinguecula and 71 (47.33%) had pterygia. Six (30%) workers had right practices in dealing with trauma to the eyes. Three (50%) woodworkers had right practices to deal with cuts/penetrative injuries to the eyes while 5 (31.25%) had right practices to deal with chemical injuries.

Woodworkers had low level of knowledge about ocular hazards and the practices adopted by workers in dealing with ocular injuries were found not to be in conformity with normal practices used in dealing with ocular injuries.

Keywords: *Ocular Hazards; Woodworker; Ocular Injuries; Hazards; Protective Eye Devices*

Introduction

Hazard is defined by Cambridge International Dictionary of English as something dangerous and likely to cause damage [1,2]. McNamee, also defined it as the chance of being injured or harmed from possible sources of danger [3]. Ocular hazard can conveniently be deduced from the above definition as something dangerous and likely to cause damage to the eye. Ocular hazards may be present in most working environments or occupations, but the severity and frequency of occurrence of their effects may vary from one occupation to the other [4].

Woodworkers are involved in activities such as bending, slicing, planning and sawing of wood, they also use glue, nails or screws to fasten pieces of wood together to make many finished products that we use in our homes and offices [5].

During these processes, woodworkers are exposed to hazards such as particles of wood, chemicals and flying objects from either the wood or instruments they operate [5-9]. It is important for these workers to know the possible hazards they face as well as the means of preventing eye related problems arising from such hazards; for healthy eyes are needed to ensure productivity [10].

A survey by the Bureau of Labour Statistics in U.S.A reported that more than 40% of injuries occurred among craft workers, like mechanics, repairers, carpenters and plumbers. Over a third of these injured workers were operatives, such as assemblers, sanders and grinding machine operators [11].

The human eye has anatomical and physiological protective mechanisms which are effective in day-to-day life. However, in the industrial environment, this natural mechanism is frequently inadequate to prevent injury, wearing of protective eye devices then become essential. It is therefore important that woodworkers wear the necessary protective devices while working in order to prevent or minimize the effects of ocular hazards [5,9,10,12,13]. While majority of injuries are minor in nature, some may be serious and these can have negative effect on productivity.

Prior to this research, the researcher's preliminary study of woodworkers at Ashaiman Timber Market revealed that 19 (95%) out of 20 woodworkers observed were not wearing any protective eye devices while working, this was an alarming situation. Matela reported that the workplace accounted for 1,000 eye injuries daily and three out of every five injured workers were either not wearing eye protection at the time of accident or were wearing the wrong kind of eye protection for the job [14].

The problems identified have an economic effect on the individual and nation at large. Injured workers spend time and money at hospitals for treatment of their injuries, workers would also have to buy anti-allergic drugs every time, for conditions such as allergic conjunctivitis would persist till contact with dust is avoided. The effects of these ocular hazards could have an unpleasant bearing on visual performance of these workers, which would eventually affect efficiency and impart negatively on the productivity of these workers. This study was undertaken at Ashaiman Timber Market in Tema, a city in the Greater Accra Region, Ghana. The purpose of this study was to determine the ocular problems associated with ocular hazards in woodwork environments and to assess the attitudes and practices of woodworkers towards the protection of their eyes.

Materials and Methods

This was a descriptive cross-sectional survey that sought to determine the kinds of ocular hazards and eye problems associated with ocular hazards amongst woodworkers at Ashaiman Timber Market on 12th January, 2009.

Woodworkers at Ashaiman Timber Market were selected for this study. At the time of this study the population of woodworkers was estimated to be about 400. A total of 150 woodworkers were selected as sample size for this study. Purposive sampling was used to select woodworkers at Ashaiman Timber Market. The market is a congregation of woodworkers so obtaining information from these workers was easy. Simple random sampling technique was used to select some woodworkers from the timber market to form the sample size.

Data was collected on the same day with examination procedures comprising, patient history, visual acuity testing, eye examination and filling out of questionnaire. Materials used comprised ophthalmoscope, pen torch, Snellen chart, near reading chart, and questionnaire.

Consent of the executives of the Store Owners Association at Ashaiman Timber Market was sought through formal notification, also woodworkers were informed of what they were required to do. No worker was coerced to participate in this research. Both Qualitative and Quantitative data analysis were done in this work. Quantitative analysis tools included tallying, ranking and percentages Questionnaire responses were entered into Statistical Package for Social Scientists version 18 (SPSS); checked and descriptive analyses were undertaken. Content analysis was used to analyze open-ended responses. This involved reading and re-reading responses to the same questions, identifying recurring themes and categorizing all responses to a particular theme to allow numerical analysis.

Results

Table 1 shows that 63 (42%) out of 150 woodworkers sampled had distant visual acuity of 6/6 and 49 (32.67%) out 150 had near visual acuity of N5.

Distant Visual Acuity			Near Visual Acuity		
VA	Number	Percentage (%)	VA	Number	Percentage (%)
6/6	63	42	N5	49	32.67
6/9	51	34	N6	50	33.33
6/18	25	16.67	N8	35	23.33
6/24	11	7.33	N10	16	10.67
Total	150	100	Total	150	100

Table 1: *Distant and near visual acuity results.*

Workers with experience of 6 to 10 years were the majority; 68 (45.33%) out of 150 workers sampled were in this group. Six (4%) out of 150 workers sampled had more than 25 years of working experience. Table 2 shows the years of experience of woodworkers.

Years of working	Number of workers	Percentage (%)
1 - 5	39	26
6 - 10	68	45.33
11 - 15	14	9.33
16 - 20	16	10.67
21 - 25	7	4.67
> 25	6	4
Total	150	100

Table 2*: Years of working experience.*

Ninety-four (62.67%) out of 150 workers obtained their woodworking knowledge through apprenticeship. Five (3.33%) out of 150 had Technical training and 51 (34%) out of 150 workers sampled acquired their woodworking skills on the job. Table 3 shows how woodworkers obtained their woodworking skills.

Mode of acquisition of skills	Number of workers	Percentage (%)
On the job training	51	34
Apprenticeship	94	62.67
Technical Training	5	3.33
Total	150	100

Table 3: *Mode of acquisition of woodworking skills.*

In assessing workers on their knowledge of ocular hazards, 10 (6.67%) woodworkers sampled had no knowledge on ocular hazards. One hundred and six (70.67%) workers mentioned only one ocular hazard. Only 1 (0.67%) woodworker mentioned four ocular hazards. Workers who did not know any ocular hazard and those who mentioned one ocular hazard were considered to have a low level of knowledge; they were 116 (77.33%) in this category. Twenty six (17.33%) woodworkers who mentioned two hazards were considered to have moderate knowledge on ocular hazards. Those who mentioned three or more were considered to have a high knowledge of ocular hazards 8 (5.34%). Table 4 shows the results.

Level of knowledge of ocular hazards	Number of woodworkers	Percentage (%)
Low	116	77.33
Moderate	26	17.33
High	8	5.33
Total	150	100

Table 4: *Knowledge of ocular hazards among the woodworkers.*

Results showed that 99 (66%) of the sampled population did not wear protective eye devices when working. One hundred and sixteen (73.33%) of the sampled population did not have any training in the use of protective eye devices. Out of a total of 51 workers who said they use protective eye devices, only 8 (15.69%) use protective eye device every time they work, the remaining 43 (84.31%) use them once in a while. Figure 1 illustrates the results obtained.

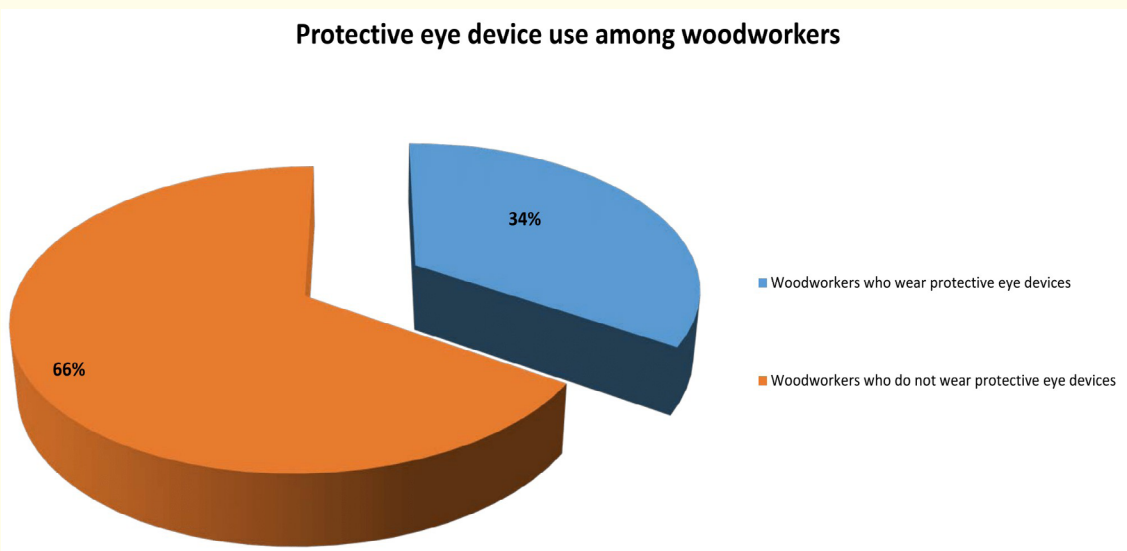

Figure 1: *Protective eye device use among the sampled population.*

From figure 1, out of 150 workers sampled, 99 (66%) workers did not use protective eye devices while working albeit 51 (34%) used protective eye devices when working.

Results show that 99 (66%) of the 150 woodworkers sampled did not use protective eye devices during work. Reasons given by these workers for non-usage of protective eye devices are presented on the Venn diagram labeled figure 2 below.

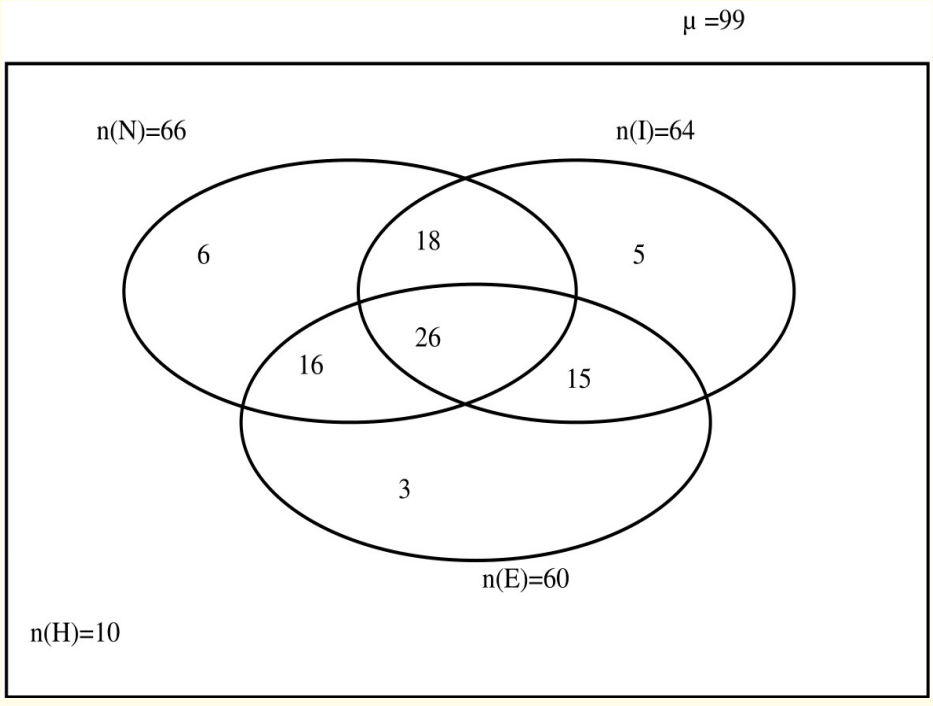

Figure 2: *Reasons for the non-usage of protective eye devices.*

From figure 2, N constituting 66 (66.67%) workers, did not use protective eye devices due to their own negligence, I constituting 64 (64.45%), said the use of protective eye devices causes inconveniences, E constituting 60 (60.61%), workers, said they did not use protective eye devices because the law did not enforce it, and H constituting 10 (10.10%) workers, said they did not use protection due to high cost of the devices.

When the frequency of occurrence of ocular injuries within the last five years of working was assessed, these were the results; 24 (39.34%) woodworkers had been injured once, 15 (24.59%) had been injured twice and 3 (4.92%) of injured workers had frequencies more than four times. The mean frequency of occurrence of ocular injuries was 2.18 times with an average of 8.13% injuries occurring in a year. Sixty one (40.67%) woodworkers had ocular injuries at least once in the last five years. Fifty nine (96.72%) workers who had injuries said they were not wearing protective eye devices at the time of injury, 59 (96.72%) said they would have prevented the injury if they had protection.

Frequency of occurrence of ocular injuries	Number of woodworkers	Percentage (%)
Once	24	39.34
Twice	15	24.59
Thrice	12	19.67
Four times	7	11.48
More than four times	3	4.92
Total	61	100

Table 5: *Frequency of occurrence of ocular injuries among the sampled population.*

The number of ocular injuries that occurred among workers who used protective eye devices were compared to those who did not use protective eye devices; figure 3 shows the results obtained.

From figure 3, fifty-four (88.52%) of the 61 workers with histories of ocular injuries were workers who did not use protective eye devices. Six (9.84%) were workers who used protective eye devices once in a while and 1 (1.64%) woodworker with a history of ocular injury used protective eye device every time.

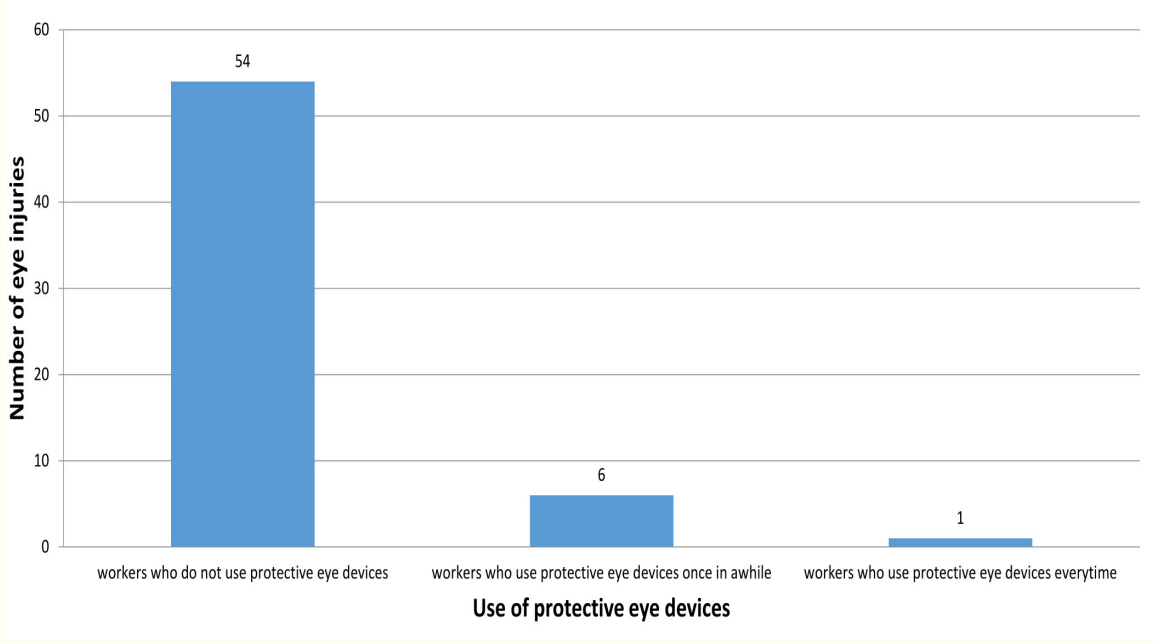

Figure 3: *The use of protective eye devices and the occurrence of ocular injuries.*

Table 6 shows the different types of ocular injuries occurring among the sampled woodworkers at Ashaiman Timber Market. Blows or trauma to the eyes was the commonest form of injury recorded, accounting for 20 (32.79%) ocular injuries. Cuts/penetrative injuries were the least form of ocular injury (9.84%). In all, four different types of ocular injuries occurred among the woodworkers; this is shown in table 6.

Types of ocular injury	Number of woodworkers	Percentage (%)
Wood particles causing abrasions	19	31.15
Blow or trauma to the eyes	20	32.79
Cuts or penetrating injuries	6	9.84
Chemical burns	16	26.23
Total	61	100

Table 6: *The various types of ocular injuries suffered by the woodworkers.*

Four other ocular problems aside ocular injuries were obtained among the sampled population. Figure 4 shows the various ocular problems identified among the sampled population.

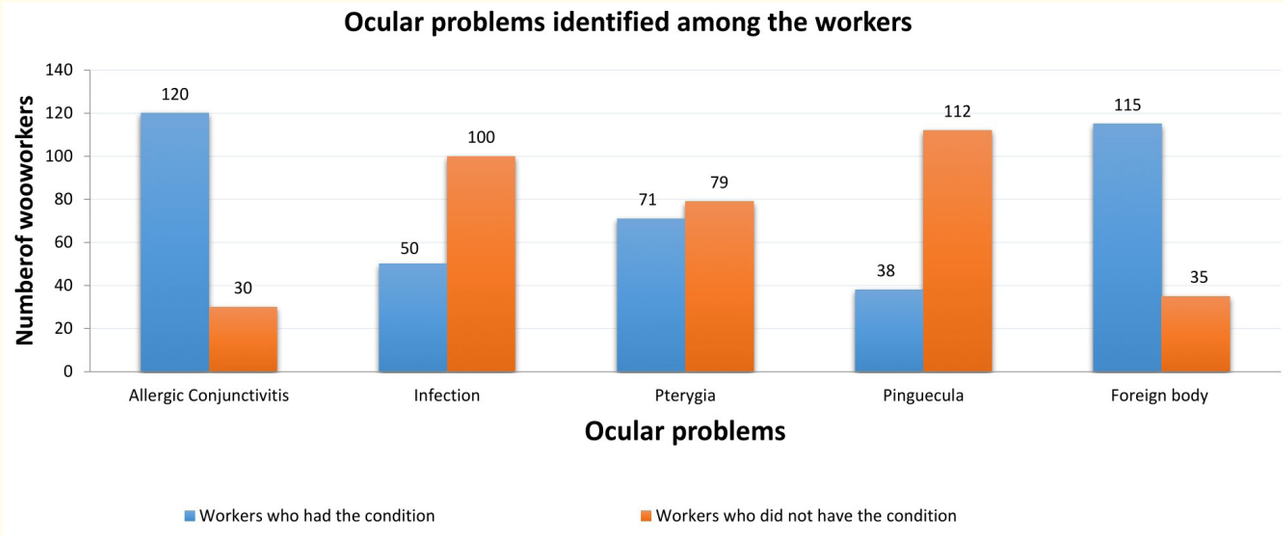

Figure 4: *Ocular problems identified among the woodworkers.*

From figure 4, one hundred and twenty (80%) of the sampled population had allergic conjunctivitis, 115 (76.67%), foreign bodies at least once, 71 (47.33%) had pterygia, 50 (33.33%), infections and 38 (25.33%), pinguecula.

Woodworkers with histories of ocular injuries were asked how they dealt with injuries. In cases of blows to the eyes, the two important actions that must be taken to deal with the injury involve application of cold compress and seeking of medical attention. A total of 20 (13.33%) of woodworkers had a blow or trauma to the eyes at least once. Figure 5 illustrates the number of actions taken by woodworkers to deal with trauma to the eyes.

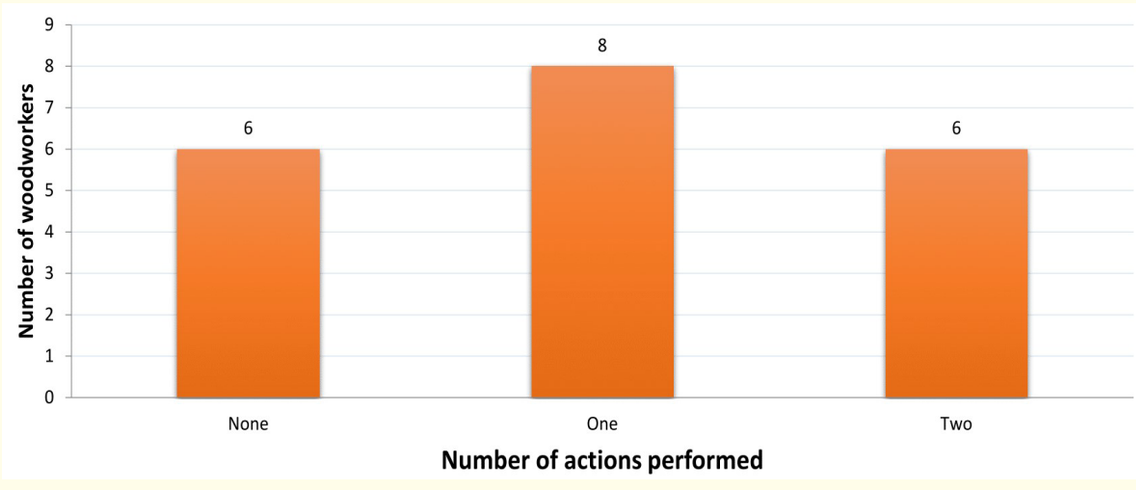

Figure 5: *How woodworkers dealt with blows or trauma to the eyes.*

From figure 5, Six (30%) workers with history of blow to the eyes performed the two important activities when they had the injury, 6 (30%) woodworkers did not perform any action and 8 (40%) performed just one action.

A total of 6 (4%) workers sampled had a history of cuts/penetrative. In cases of penetrative injuries involving the eyes, appropriate actions that must be performed are covering the eyes and seeking medical attention. An inappropriate action identified in responses given by woodworkers was the use of shirts in cleaning chemicals. Figure 6 shows the number of appropriate and inappropriate actions taken to deal with injuries.

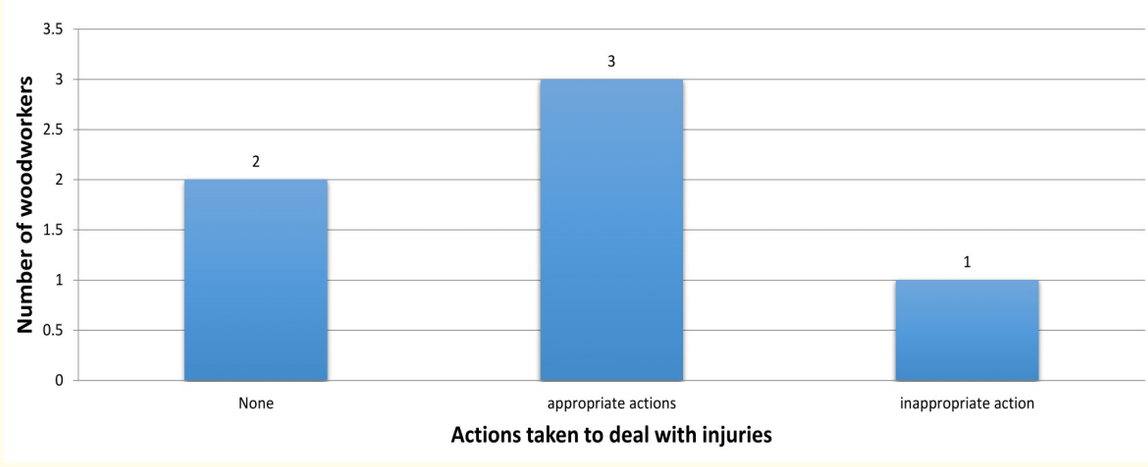

Figure 6: *How woodworkers dealt with cuts or penetrative ocular injuries.*

From figure 6, two (33.33%) workers with penetrative ocular injuries did not perform any action when they had injuries. Three (50%) workers performed two appropriate actions; this was covering the eyes and seeking medical attention. One worker (16.67%) performed an inappropriate action; that was washing the eyes.

A total of 16 (10.67%) woodworkers had histories of chemical injury. In cases of chemical injuries, the two important actions that must be taken involve washing the eyes with water and seeking medical attention. A wrong action involves the use of other materials to clean the chemicals such as shirts or handkerchiefs. Figure 7 shows how workers dealt with chemical injuries.

Figure 7: *How woodworkers dealt with chemical injuries.*

From figure 7, five (31.25%) woodworkers with a histories of chemical injuries performed two important activities when they had the injuries; this was washing the eyes with water and seeking medical attention. Six (37.5%) performed only one important activity. Five (31.25%) used their shirt to wash the chemical; this is a wrong action that was taken.

Discussion

Out of a total of 150 woodworkers sampled, 140 (93.33%) knew some ocular hazard, 10 (6.67%) of the woodworkers did not know of any ocular hazard. One hundred and six (70.67%) workers mentioned only one ocular hazard. Only 1 (0.67%) woodworker reported four ocular hazards. Detailed analysis showed that 77.33% had low level of knowledge about ocular hazards. About 17.33% had moderate level of knowledge on ocular hazards while 5.33% had high knowledge of ocular hazards. All 140 (93.33%) who knew some ocular hazards mentioned wood dusts.

In Oyo state of Nigeria, Bolaji reported that 23.1% carpenters in the study population had low level of knowledge of hazards in their environment working, 61.5% had moderate knowledge while 15.4% had high level of knowledge on hazards. He concluded that only a very small proportion of the carpenters had low level of knowledge on the hazards they face in their workplace. Comparing the researcher's results to that of Bolaji, it could be deduced that woodworkers at Ashaiman Timber Market had a low level of knowledge of ocular hazards compared to carpenters in Oyo State of Nigeria [15]. Carpenters in Oyo State had high knowledge on hazards that affected them in their working environment because Bolaji worked on general hazards while this project was about knowledge on ocular hazards among woodworkers [15].

Ninety nine (66%) of the woodworkers did not wear protective eye devices when working. About 24.24% workers who did not wear protective eye devices mentioned one reason for not doing so, 49.49% mentioned two reasons and 26.26% mentioned three reasons. The reasons 66.67% workers gave for non-usage of protective eye devices were negligence on their part, 64.47% woodworkers sighted inconveniency in the use of devices, 60.61% of them said non-enforcement of the use of devices and 10.10% of the workers said the devices were expensive.

A research conducted by Kwame., *et al*. [5] showed similar trend, in that, a significant number of workers did not use personal protective equipment when operating or performing jobs that demanded their use. Helmet and goggles were generally not used to protect the head and eyes due to inadequate supply. Jerie [10] also indicated in his study that there was poor and inappropriate use of personal protective equipment in wood processing industries. Majority of workers in his study and Mitchual., *et a*l. [9] attributed non-usage of personal protective equipments to discomfort.

In a research by Bolaji in Nigeria, 50% of the population mentioned only one reason for not wearing protective devices while working, 24.4% mentioned two, 16.7% mentioned three reasons while 7.7% mentioned four reasons and only 1.3% mentioned five reasons [15]. The reasons for non-usage of protective eye devices were high cost of procurement of these gears (82.05%), non-enforcement of the use of device (83.33%) and device not being commonly used in various communities (28.21%).

The reasons most woodworkers at Ashaiman Timber Market gave for their non-usage of protective eye devices were similar to the reasons found by Bolaji. Although the devices are expensive, this was not a problem for the workers because employers bought the protective eye devices for them. Most workers (73.33%) did not have any training in the use of protective eye devices and this could explain the reason why workers complained of inconveniences in the use of the protective devices. This could also account for inconveniences in the use of the devices by woodworkers [15].

A total of 61 (40.67%) workers had ocular injuries at least once in the last five years. All 61 (100%) of workers with history of injury were not wearing protective eye device at the time of injury. 24 (39.34%) workers had been injured once, and 15 (24.59%) had been injured twice. The mean frequency of occurrence of injuries per worker that occurred during the last five years was 2.18 times. 8.13% woodworkers had been injured at least once in the last one year. In all the injuries recorded, woodworkers were not wearing protective eye devices.

A study was conducted by Payne., *et al*. [16], involving 495 consecutive primary care patients treated for woodworking, home repair, and wood-related construction injuries. The mean number of eye injuries in a year was 1.2 and the estimated annual injury rate was 3.3/1000 residents. The mean number of eye injuries per worker among the sampled population in this research was 2.18, higher than that obtained by Payne., *et al*. [16]. The sample size used by Payne., *et al*. [16] was larger than that used in this research and this could account for the difference in the mean frequency of occurrence of eye injuries.

More workers (88.52%) who did not use protective eye devices had ocular injuries compared to workers (1.64%) who used protective eye devices every time they worked. Another research also found out that more (80.6%) of workers with work-related eye injuries did not use protective eye devices than the control group (62.7%) who use protective eye devices [17]. Injuries have both physical and economical effect on the affected worker; the aim of every organization is to decrease anything that has a negative effect on productivity. Injuries have negative effects on productivity for times spent at hospitals and homes recuperating could have been channeled to doing work.

A number of eye problems were found to be associated with some ocular hazards found in woodworking. Results showed five different eye problems related to hazards in woodworking areas in addition to eye injuries. Allergic conjunctivitis was found to be the problem woodworkers faced the most for 120 (80%) workers had allergic conjunctivitis. This condition could be attributed to reactions to the wood dusts in woodworking environment. In a research work by Milanowski., *et al*. 16 (33.3%) workers had allergic conjunctivitis out of a total of 48 woodworkers examined [18].

One hundred and fifteen (76.67%) of the sampled population had foreign bodies in the eye at least once; workers explained that they ever had wood particle or dust stuck either under the lower lid or upper lid. According to the woodworkers, foreign bodies could cause severe pain and a few times resulted in pain and discomfort. The U.S. Bureau of Labour Statistics reported in 2008 that 70% of eye injuries resulted from flying or falling objects getting stuck in the eyes; these injuries cause severe pain [11,19].

Pterygia and pinguecula were some of the problems found among the sampled woodworkers at the Ashaiman Timber Market. Seventy one (47.33%) had pterygia while 31 (25.33%) had pinguecula. McCarty., *et al*. found out that although dust has been found not to be the main cause of pterygia and pinguecula, the presence of dusts increases the risk of pterygium growth. Dusts have also been found to cause an existing pterygium to be inflamed and cause severe pain, itchiness and irritation. One major problem with pterygium is the fact that it can grow to cover the pupil and interfere with the vision of the affected individual [20].

Fifty (33.33%) of the woodworkers were found to have infections and the severity varied from mild to moderate. Workers said they mostly bought drugs from pharmacy shops to treat such problems and visited the hospital a few times. A research by Hameed., *et al*. and Puntarić., *et al*. showed that microorganisms could be found on wood surfaces when they worked on organic dust and gaseous contaminants at wood working shops [21,22]. Pramo [23] and Badirdast., *et al*. [24] also reported that exposure to biohazards such as fungi and bacteria could cause adverse health effects such as infections of the eye with varying severities.

These results confirmed that apart from ocular injuries, woodworkers could suffer from other eye problems which might cause pain, discomfort and economical loss if efforts are not made by these workers to use protective eye devices [5,9,10,12,13,24].

The way ocular injuries are handled could either reduce the extent of injuries or cause complications. A total of 20 (13.33%) woodworkers had a history of blows to the eyes. Matela outlined that in cases of blows or trauma to the eyes, cold compress must be applied and medical attention sought for. Only 6 (30%) woodworkers with histories of blows to the eyes performed these two important activities outline by Matela. Eight (40%) performed just one of these actions and 6 (30%) took no action [14].

Analysis of 6 (4%) workers who had a history of cuts/penetrative injury involving the eye showed that, 3 (50%) of workers with a history of cuts performed the two appropriate actions outlined by Matela in dealing with cuts of any part of the eye. According to Matela an attempt should not be made to remove the stuck object in situations of cuts or penetrative injuries, the eye should be covered and medical attention sought. One (16.67%) worker washed his eyes; this is a wrong activity [14].

A total of 16 (10.67%) woodworkers had chemical injuries at least once in the last five years. Matela outlined that in situations of chemical injuries, two important actions must be taken; water must be used to wash the eyes and medical attention sought for. Five (31.25%) of those workers adhered to the principles of dealing with chemical injury outlined by Matela. Six (37.5%) performed only one of the actions. Five (31.25%) performed a wrong activity by using their shirts to clean the chemicals in their eyes [14].

Conclusion

By and large, woodworkers had low level of knowledge about ocular hazards and the practices adopted by woodworkers in dealing with ocular injuries were found not to be in conformity with normal practices used in dealing with ocular injuries.

Conflicts of Interest

There are no conflicts of interest regarding this research.

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