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Original Article

Magnitude and Characteristics of Occupational injury in Kombolcha textile factory, North East Ethiopia

Abstract:

Background: Working environment is one of the factors which can determine public health conditions as many workers spend a large portion of their time at work. **Objective:** The aim of this study was to assess the magnitude and characteristics of occupational injury among workers in Kombolcha textile factory, North East Ethiopia. **Methods:** Institution based cross-sectional study design was conducted from April1-15, 2013 among 455 randomly selected workers after stratification by working departments. A structured questionnaire based interview, review of records of injury report and walk through survey using work environment observation checklist were used to support the self-reported information. Descriptive statistics were used for analysis using SPSS version 20. **Results:** The overall occupational injury prevalence rate was 36.9%. Puncture, abrasion/laceration, fracture, cut and back pain were the most common types of injury. Most of the sources of injury were due to machinery, lifting heavy objects, splinters, fall and hand tools. **Conclusion:** The magnitude of occupational injury at Kombolcha textile industry showed a high prevalence that indicates the need to work on integrated injury prevention by mainstreaming occupational health and safety procedures in all working departments of the factory.

Key Words: Occupational injury; Textile Factory; Safety; Prevalence; Injury characteristics.

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Introduction

The Growth and Transformation Plan (GTP) of Ethiopia advocates the importance of textile and garment industries in the fact that it can employ a large number of workers directly or indirectly as a result of its backward and forward linkages with different sectors of the economy. There is an enormous potential of enhancing the country's foreign exchange earnings through the wide range of exportable textiles and clothing products. In addition to this the labour sector is one of the cross-cutting segments with strategic objective of ensuring effective enforcement of labour law and support job seekers.[1]

However occupational health and safety information in textile industry is minimal. This study is aimed at assessing the characteristics of occupational injuries among workers in Kombolcha textile factory.

Different parts of human body are susceptible for work related injuries. The data on types of injury with the related injured parts of the body can help policy makers, managers, industrial hygienists, public health experts, to provide and design appropriate personal protective equipment and safe ergonomic design.[2-5]

Methods

Institutional based cross sectional study design was used to investigate the characteristics of occupational injury in Kombolcha Textile Industry from April 1-15, 2013.

Kombolcha textile factory was established in 1986. It is located 380 Kilometres far from Addis Ababa with a total of 1584 workers of which 905 (58%) are males and 679(42%) are females. It is engaged in the production of towels, bed sheets and home fabrics using cotton. In the factory there is an insurance mechanism for workers that may be injured during work. This encouraged the workers to report every accident they faced while working. All workers in the factory were considered as source population. Workers who were directly engaged in the production process were considered as study population. Administrative workers were excluded assuming that they may not be exposed to factors of occupational injuries.

The sample size was calculated using Open Epi version 2.2 statistical software's program for sample size for a proportion applying finite population correction because total population in the factory is less than 10,000. Using 95% CI, 50% expected prevalence and 4% of margin of error. The calculated sample

size was 413 and by considering 10% non response rate the total sample size used in the study was 455.

Four departments were selected as the major areas of the factory where workers have direct involvement in the production process. The calculated sample size was identified by stratified sampling technique to the four departments assuming that work-related injury varies with the nature of the work. Study subjects were allocated according to the proportion of workers load in the department. Finally the study subjects were drawn by simple random sampling from each Department by Open Epi version 2.2 statistical software random numbers generator from the sampling frame in the list of workers from the respective departments. In the study, terms were operationally defined as follows; Occupational Injury: Any physical injury condition sustained by the worker in connection with the performance of his/ her work but does not include work related diseases that need exposure assessment or laboratory tests and doctoral examination.[6] Personal Protective Equipment (PPE): Utilization of the worker-specialized clothing or equipment worn by employees for protection against health and safety hazards at the time of interview. Personal protective equipment is designed to protect many parts of the body, that include, eyes, head, face, hands, feet, and ears.[7] Safety guarding of machine: the machine is safe if it safegaurds workers from contacts with dangerous moving parts. [6]

Ethical clearance was obtained from the Ethical review board of University of Gondar. And supporting letter was obtained from South Wollo labour and social affairs department. The purpose and importance of the study was explained to the participants. Data was collected after full informed verbal consent of participants.

A questionnaire adapted from standard occupational health and safety guidelines and other studies with little modification were prepared for collecting the data via face to face interview. Record review of reports of injuries from factory's clinic and walk through survey using observation checklist were also done by the principal investigator to support the self-reported information. The quantitative data was cleaned, entered and analysis was done using SPSS for windows version 20.

Results

Socio-demographic Characteristics

A total of 455 workers participated in this study with the response rate of 100%. 321(70.5%) workers were males. The mean (±SD) age of the participants was 40.27±8.04. The majority of the study population 245 (54. %) have educational level of grade 9 and above. Regarding employment pattern, 392 (86.2%) were permanently employed. 201 (44.2%) of the study participants earned greater than 1092 Ethiopian Birr (ETB) including overtime payment per month. Socio demographic characteristics of the study subjects are presented in Table I.

Table I Distribution of socio-demographic characteristics of respondents in Kombolcha textile factory April, 2013 (n=455)

Variables	Number (n)	Percent (%)
Sex		
Male	321	70.5
Female	134	29.5
Age		
14-29	54	11.9
30-44	256	56.3
45+	145	31.9
Religion		
Orthodox	203	44.6
Muslim	221	48.6
Protestant	31	6.8
Educational Status		
Illiterate	100	22.0
Read and write	60	13.2
Primary school(1-8)	50	11.0
Secondary school(9-12)	113	24.8
Technical /vocational	106	23.3
First degree and above	26	5.7
Marital status		
Single	67	14.7
Married	330	72.5
Divorced	25	5.5
Widowed	18	4.0
Separated	15	3.3
Employment Type		
Temporary	63	13.8
Permanent	392	86.2
Monthly income		
≤1092	254	55.8
>1092	201	44.2
Working experience		
≤5years	70	15.4
>5years	385	84.6

Distribution of occupational injuries and Characteristics

Among the study participants, 168(36.9%) had responded that they had incident at job that resulted occupational injury in the past 12 months which brings the overall prevalence rate of 36.9% . Out of the injured workers, 75 (44.6%) had experienced work-related injuries in the last two weeks period prior to data collection. Of these cases, 16(21.3%) reported that they had sustained work related injury more than once. (Table II)

Injured respondents were also asked about body part affected, types and sources of injury. The commonly affected parts of the body were hand 83(48.8%), toe 27(15.9%), back 25(14.7%), and eye 23(13.5%). Regarding types of injury, puncture 54(32.7%), abrasion/laceration 53(32.1%), fracture 30(18.2%), cut 28(17%)

predominant types of injury. The commonest sources of injury were found to be machines 84(49.7%), lifting heavy objects 32 (18.9%), splinters 29(17.2%) and fall 22 (13%) orderly. (Table III and IV)

Table II Distribution of work-related injury in the last 12 months among respondents in Kombolcha Textile factory workers, April,2013

Variables	Number	Percent
Work-related injuries in the last 12 months		
Yes	168	36.9
No	287	63.1
Number of occurrences		
Once	117	69.6
More than once	51	30.4
Work-related injuries in the last 2 weeks		
Yes	75	16.5
No	380	83.5
Number of occurrences		
Once	59	78.6
More than once	16	21.4

Injured respondents were asked to recall the reasons during the occurrence(s) of the incident(s). Based on the result, perceiving as working behaviour 68(39.8%) and not using PPE 55(32.2%) were among main reported reasons by workers.

Severity of work-related injuries

Out of the total 168 injured respondents, 73(43.45%) were hospitalized where 67% of the hospitalization were for more than 24 hours.137 working days were lost as result of work related injuries in the last 12 months. There was no reported death as a result of work related injuries.

Description of work environment and Ergonomic variables

Among study participants, 39(8.6%) reported that they were at work for more than 48 hours per week. 326(71.6%) of respondents had been regularly supervised at work about health and safety. Regarding safety and health training, 249 (54.7%) responded that they had never taken safety and health training. Participants were also asked about manual handling activities like (pulling, pushing, carrying and lifting tasks) which may contribute for workplace accidents and musculoskeletal disorders. 227(49.9%) of them respond that their job involve these activities. It was found that 265(58.2%) and 283(62.2%) of the participants worked with safely guarded and timely maintained machines respectively. (Table V)

Table III Parts of the body injured and types of injury among workers in Kombolcha textile factory April, 2013(n=168)

Injury characteristics	Number (n)	Percent (%)
Parts of the body affected		
Hand	83	48.6
Toe	27	15.9
Back	25	14.7
Eye	23	13.5
Knee	19	11.2
Tooth	17	10.0
Finger	15	8.8
Head	10	5.9
Upper arm	6	3.5
Lower leg	6	3.5
Ear	4	2.4
Chest	3	1.8
Lower arm	1	0.6
others	1	0.6
Types of Injury		
Puncture	54	32.7
Abrasion/Laceration	53	32.1
Fracture	30	18.2
Cut	28	17.0
Back pain	18	10.9
Dislocation	14	8.5
Eye injury	13	7.9
Poisoning	9	5.5
Suffocation	6	3.6
Burn	6	3.6
Electrocution	4	2.4
Ear injury	4	2.4
Others	7	4.2

Observation of work environment using Checklist

Eight working sections from four sampled departments were inspected to identify potential occupational health and safety hazards and health and safety service provisions based on the operational definition given on the observational checklist. The survey revealed that workers in Kombolcha textile factory were highly exposed to high level of heat, noise, dust, chemicals and uncomfortable light.

Table IV Sources of injury among injured workers in Kombolcha textile Factory April, 2013 (n=168)

Sources of Injury	Number (n)	Percent (%)
Machinery	84	49.7
Lifting heavy objects	32	18.9
Splinters	29	17.2
Fall	22	13
Hand tools	19	11.2
Acid and acidic substances	17	10.1
Hot substances	10	5.9
Collision	7	4.1
Electricity	5	3.0
Falling objects	4	2.4
Others	1	0.6

Table V Working environment and ergonomic related factors among workers in Kombolcha textile Factory, April, 2013(n=455)

Variables	Number (n)	Percent (%)
Hours worked per week		
≤48 hours	416	91.4
>48 hours	39	8.6
Safety supervision		
Yes	326	71.6
No	129	28.4
Safety training		
Yes	206	45.3
No	249	54.7
Working Department		
Engineering	42	9.2
Processing/garment	117	25,7
Weaving	128	28.1
Spinning	168	37.0
Manual Handling		
No	228	50.1
Light(not greater than 5kg)	39	8.6
Medium(6-10kg)	43	9.5
Heavy(11-20kg)	60	13.2
Very heavy(>20kg)	85	18.7
Time spend on manual handling/ day		
<2 hours	63	27.7
2-4hours	26	11.5
>4 hours	138	60.8
Visual Concentration		
Yes	390	85.7
No	65	14.3
Use of Vibrating Tools		
Yes	166	36.5
No	289	63.5
Time spend on vibrating tools		
≤ 1 hour	28	16.9
2-4 hours	26	15.7
>4 hours	112	67.4
Safely Guarded Machines		
Yes	265	58.2
No	190	41.8
Maintenance of machine		
Yes	283	62.2
No	172	37.8

No first aid equipments were observed in any of the working sections that might be severe if injury occurs at work before reaching to the clinic. There was a medium level clinic. The company had no Safety and health regulations but had health and safety committee composed of representatives from worker's and employers' group as per safety and health committee establishment guideline. There was no professional safety officer. The committee was giving some occupational health services like safety education, accident registration books and quarter based (once in three months) evaluation in collaboration with zonal bureau of Labour and social affairs. (Table VI)

Table VI Occupational health and safety hazards identified in working sections, Kombolcha textile factory, April 2013.

Working department	Hazards Identified
Weaving	
1.Bale house and waste packing	-Excessive heat, excessive dust, no first aid and fire extinguisher -Risk of falling because the ladder is 90° from the ground(it should be 45)
2.Blowing and carding	-Excessive heat, excessive dust, excessive noise(91-101dB) Slipperywall, uncomfortable lighting condition (120 lux) it should be 300-400 lux, unguarded machines, routine manual handling, long standing. The dangerous risk is fire. The risk of eye injury because of splinters
Spinning	
1.Drowing frame and foving	-Excessive dust, uncomfortable light (100Lux),excessive noise(93dB),slippery wall, No PPE provision for temporary workers
2. Winding	-Light (70Lux), excessive noise (101dB), slipperywall, excessiveheat, no fire extinguisher, no first aid kit and emergency exits are not clear. splinters
Processing/garment	
1.Quality checker and mender	-Long sitting work, high visual concentration, glare
2. Paste preparation	-Excessive noise,PPEs are not as to the standard, excessive noise, chemicals, no emergency shower,
Engineering	
1. Power attendant	- Naphta,oil and paints, sulphuricacid, excessive dust
2. Foundry	-Excessivenoise, excessiveheat, no sufficient PPE

Discussion

Occupational injury is a global public health and economic burden in addition to other public health challenges in both developed and developing countries.[8, 9] However, the magnitude had got unstable estimate in developing nations

where occupational injury prevention system is not well organized and there by a challenge for development of occupational health services to prevent and control of the problem .[8]

The overall prevalence of occupational injury in this study was 36.9%.Studies in Brazil, Norway and Nigeria showed the magnitude of occupational injuries as 56, 35, 132 workers per 1000 per year respectively.[10-12]

This study showed lower rate of injury compared to the study done on industrial workers in large scale metal manufacturing industries in Addis Ababa with the prevalence of 48.9%.[13] This might be because preventive occupational health and safety measures at work place such as presence of work place supervision 328(71.6%), 206 (45.3%) of workers were trained about health and safety, better use of personal protective devices 359(78.9%), lower rate of working for more than 48 hours per week 39(8.6%) and most of the machines were guarded safely and maintained timely which contributed to the decrease in the rate of occupational injuries.

This study showed that puncture, abrasion/laceration , fracture, cut and back pain as the most common types of Injury which is consistent with the result of a study done on small and medium scale industries in Gondar[14] except the back pain in this result. This could be mainly because almost half of the workers 227 (49.9%) were engaged in a work that need manual handling activities like pulling, pushing, carrying and lifting activities, as a result, they may contribute to increase the risk of back pain .

Five common parts of the body injured in this study were hands, toe, back, eye and knee. This finding is consistent with other findings in Ethiopia.[13, 14]

With regard to sources of injury, this study showed machinery, lifting heavy objects, splinters, fall and hand tools as the common sources of injury. This result is

inconsistent with other studies done on small and medium scale industries in Gonder woreda and large scale metal manufacturing industries in Addis Ababa [13, 14] which pointed out machinery, hand tools, splinters and fall as the frequent sources of work related injuries except lifting heavy objects indicated in this study. This could be mainly because almost half of the workers 227 (49.9%) were engaged in a work that need manual handling activities like pulling, pushing, carrying and lifting.

Limitations of the study

- Respondents may not recall occurrence(s) of occupational injury during one year period that may underestimate the overall prevalence (recall bias).
- Study participants might also perceive that responding as injured might bring benefits; this can result in overestimation of prevalence (social desirability bias).
- Workers at sick leave, injured workers at home may underestimate the overall prevalence and unable to detect associations.
- Lack of similar studies particularly in Ethiopia made difficult in comparing results.

Conclusion

The magnitude of occupational injury at kombolcha textile industry showed a high prevalence that indicates the need to work on integrated injury prevention by mainstreaming occupational health and Safety procedures in all working departments of the factory.

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