



Occupational health and safety related knowledge, attitude and practice among metal workers of Bogura city

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ABSTRACT

Compliance with the occupational health and safety (OHS) measures at workplace is an important step towards providing a healthier welding workplace especially in developing countries like Bangladesh where such measures are commonly not well-considered. Therefore, this study aimed to assess the knowledge, attitude, and practice of occupational health and safety among metal workers. We conducted a cross-sectional study among the 424 metal workers who were working in the different wards of Bogura city, Bangladesh. Data was collected through face-to-face interviews using a standard structured questionnaire which included demographic characteristics, and questions specifically designed to assess the knowledge, attitude, and practice (KAP) of the study subjects. Knowledge and attitude were measured using composite scores and data were analyzed using SPSS. About 71% of the respondents had good knowledge about occupational health and safety, 61.6% of the respondents had a favorable attitude and 72.6% of the respondents had good practice about occupational health and safety. Most of the workers (53.5%) were 22-27 years old and 42.9% completed primary school. Regarding their work environment, 90.3% reported the presence of excessive dust, 85.1% reported disturbingly high sound and 50.2% reported radiation from welding. Only 32.55% knew that exposure to chemicals (inhaled sprays, spilled on body, etc.) during work causes a problem on health. Only 17.5% and 29.7% of the respondents reported that they had training on OHS before they started work and within the last one year, respectively. The overall knowledge, attitude, and practice related to OHS and metal workers in Bogura pose a public health concern. This calls for urgent intervention in providing on-the-job training as well as implementing a safer work environment, medical checkups, and improved pre-service training for new staff.

INTRODUCTION

Occupational health and safety are the concern of human wellbeing that, this day, industrialization and service giving sectors development is accelerating resulting in workplace health problem booming. Occupational hazard is defined as the “potential risk to the health of a person emerging from an unhealthy environment” which is a significant public health issue. It can also be referred to as any activity, materials, process, or situation that is likely to cause an accident or disease at the workplace (Fasunloro and Owotade, 2004). Although improvements in occupational health have been seen in many developed countries, however, the protection of workers from

work-related disorders is not a priority in many developing countries, partly because several other health issues have competed with occupational health. This situation has existed for a long owing to various socio-economic, cultural, and political challenges which often make occupational health not prioritized (Nuwayhid, 2004). This has made occupational health and safety which is a fundamental right in maintaining workers’ wellbeing to remain neglected in developing countries like Bangladesh (Nuwayhid, 2004; Ahasan and Partanen, 2001). Workplace safety and health hazards nowadays are considered as a driving force toward finding solutions how to prevent them from the manufacturing industries employee negative consequence. In recent years,

the quality, health, knowledge, and safety requirements in many countries have been more stringent than was the case previously seen. Some research findings concluded that pressures from communities have led to the enactment of various safety legislations and safety standards in different countries and regions for different industries argue that different international and national safety standards guide to help organizations to develop their safety management systems (SMS) concerning varied business needs and requirements (Dejoy and Southern, 1993; Ahonen, et al., 2002).

Nowadays, workplace safety is considered by World Health Organization (WHO) a priority setting for health promotion in the 21st century (Takala, 1999). Every year, International Labor Organization (ILO) reports that job-related accidents and diseases claim an estimated 2.34 million lives of men and women giving a daily loss of 6,300 lives due to work-related causes. Moreover, 160 million occupational diseases are reported each year (ILO, 2013).

There are many varieties of workplace safety hazards causing factors. Developed countries like North American, Europe, and Australia are planning and budgeting for workplace safety and health prevention better than the rest of the world. But in Bangladesh there is no budgeting on it. That's why metal workers are suffering a lot from many diseases. Reports of the involvement of human activities in manufacturing processes from developed to developing countries have added a new dimension on the health front.

The objective of the study was to assess the knowledge, attitude, and practice of occupational health and safety among metal workers. The findings from this study shall assist in creating a baseline in identifying the hazards and compliance among staff members with good occupational health and safety practices. It will also help identify factors that determine their level of knowledge, attitude, and compliance with safety standards among metal workers and is expected to provide data needed by health planners in promoting education to occupational health and safety.

MATERIALS AND METHODS

Data collection

This was a descriptive cross-sectional study to assess the level of knowledge, attitude, and practice of occupational health and safety among metal workers. Metal workers group who were working in the different wards (unit) of Bogura city for at least 6 months included in this study. An interview was designed by semi-structured questionnaire to obtain information on the date of survey, age, residence, marital status, education, cigarette smoking, excessive dust, disturbingly high sound, radiation from welding, raw material use, training on OHS, knowledge related to OHS, occupational accidents, attitude, and level of preventive practice. The study was conducted from June 2019 to November 2019. A total of 424 participants were face-to-face interviewed in this study. Data were collected on seven main questions covering knowledge about the workplace hazards, health problems related to these hazards, effects of dust on health, and protective measures and equipment was assessed. The attitude and practice of the workers towards the hazards including the availability of PPE; the type of equipment provided; the training and the frequency of using the PPE (All the time, sometimes, or never used them) were addressed.

Data analysis

After collection of data, data was checked, entered and analyzed. Independent variables were tested through Chi-square test. Odd ratio, Multinomial logistic regression, Multivariate logistic regression model were done by SPSS 23.

Ethical considerations

Formal permission was taken from the respected authority to collect data. Informed consent was taken from every respondent. Privacy and confidentiality regarding the study was maintained strictly.

RESULT

A total of 424 workers were included in this study. The baseline socio-demographic factors of the

participants were such as age, educational status, occupation, marital status, monthly family income, residence, smoking, and health problem. Knowledge regarding factors includes exposure to metal dust cause problems on health, the sound created during cutting metal cause problem on health, radiation during welding causes a problem on health, wearing safety glasses or goggles can protect the eye from radiation during welding, all types of gloves provide the same level of protection, exposure to chemicals (inhaled sprays, spilled on body) during work cause problem on health, fire extinguishers (sand buckets) should be readily available at our workshop, exposure to chemicals (inhaled sprays, spilled on body) during work cause problem on health, damage by electricity can be considered a potential hazard in the workshop. Practice regarding factors includes, use personal protective equipment, agreeing to wear PPE with own cost, you ever had an injury on duty, being comfortable when using PPE, buying new PPE when your PPE was lost, encouraging the worker to use PPE. Attitude regarding factors includes, necessary to have medical checkups annually for work-related disorders, the worker needs to be trained of using clothing, gloves, face mask, glass, not continue working if I lack personal protective equipment, current working environment (space, PPE availability) should be changed for the better health of the workers, health workers should monitor the use of clothing, gloves, face mask, glasses, at least once in year training should be given to us on occupational health and safety.

Among the 424 study respondents, 301 (71%) respondents had good knowledge and 123 (29%) respondents had poor knowledge. The attitude was favorable among 261(61.6%) respondents and attitude were not favorable among 163 (38.4%) of the respondents. Practice status was good only 308 (72.6%) respondents and poor in 116 (27.4%) respondents. Socio-demographic Characteristics of Respondents: The participants were more knowledgeable among the age group 22-27 Years (48.8%) and 16-21 years only (42.5%). Most of the respondents were primary level (34.9). Rural people (77.1) had good knowledge about occupational health and safety. Lower-income workers had very little knowledge (23.9) and Practice (20.8) about occupational health and

safety. Paid permanent (72.1%) workers were more knowledgeable compared to the Paid casual workers of occupational health and safety. Among the 424 study respondents, 301 (71%) respondents had good knowledge and 123 (29%) respondents had poor knowledge. The sound created during cutting metal can cause problems health (95.7%), radiation during welding cause problems on health (56.5%), wearing safety glasses or goggles can protect the eye from radiation during welding (77.1%) and two-thirds of the interviewed respondents knew about exposure to chemicals (inhaled sprays, spilled on body) during work cause problem on health. The majority (77.7%) of study workers knew electrical hazards. Most of the respondents, 228 (75.7%) had knowledge of damage by electricity can be considered a potential hazard in the workshop. The mean score of respondents to the knowledge questions out of nine questions was 4.5 (the mean score was calculated as the total score obtained from the respondents divided by sample size). Respondents of 4.5 and above were considered knowledgeable on occupational hazards. Among the respondents, 90.7% (273) reported the presence of excessive dust and 95.7% (288) disturbingly high sound. Some 56.5% (170) reported that there was some kind of radiation from welding.

Regarding the practice of the study subjects related to OHS they were asked to list some of the PPE and to answer six questions related to OHS. Based on this, Helmets were mentioned by maximum number, 405 (95.5%), of the respondents followed by Masks 345(81.4%), Safety glasses or goggles were mentioned by the, 246(58.0%) number of the respondents, Gloves were mentioned by the, 185(43.6), Safety shoes were 174(41%) number of the respondents.

The study subjects were asked if they experienced occupation-related accidents and were specifically assessed for the presence of eight work-related complaints. The result was that the highest complaint presented was red-eye 91(21.5%) followed by Eye Itching 84(19.8%) while sleeping disorder complaints were presented 85(20%), Short breath complaints were 70(16.5%).

Regarding the attitude of respondents on points related to OHS, six statements were presented to

which they replied with strongly agree, agree, neutral, disagree, and strongly disagree. Accordingly, it was found that they have a generally favorable attitude related to OHS especially on giving OHS annually medical checkups basis 354 (97.5%) and on the training of using clothing, gloves, face mask, glass the use of PPE 251 (59.2%).

We fit a multinomial logistic regression model with knowledge, attitude, and practices of occupational health and safety among metal workers. It appears that 95% confidence interval residence (OR=6.012, P-value=.001), Marital status (OR=.269, P-value=.001, smoking (OR=.107, P-value=.001), radiation during welding cause problems on health (OR=9.673, P-

value=.001), ever had an injury on duty (OR=34.405, P-value=.001), comfortable when using PPE (OR=15.996, P-value=.001) are significant factors for occupational health and safety among metal workers. In fact, the p-value is found <0.05 which indicates a significant relationship between those factors and level of knowledge, attitude, and preventive practices of occupational health and safety among metal workers. However, marital status, wearing safety glasses or goggles can protect the eye from radiation during welding, exposure to metal dust causes a problem on health, and use personal protective equipment are not significant but they are suspicious, and they have to need further investigation.

Table 1: Attitude related factors among the respondent

Attitude	Strongly agree number (%)	Agree number (%)	Neutral Number (%)	Disagree number (%)	Strongly disagree number (%)
Is it necessary to have medical checkups annually for work-related disorders	162 (38.2)	192 (45.3)	40 (9.4)	18 (4.2)	12 (2.8)
Does the worker need to be trained in using clothing, gloves, face mask, glass	20(4.7)	231(54.5)	113(26.7)	36(8.5)	24(5.7)
Should you not continue working if I lack personal protective equipment	24(5.7)	142(33.5)	183(43.2)	63(14.9)	12(2.8)
Do you think the current working environment (space, PPE availability) should be changed for the better health of the workers	28(6.6)	152(35.8)	185(43.6)	58(13.67)	1(0.23)
Do you think health workers should monitor the use of clothing, gloves, face mask, glasses	45(10.6)	144(34.0)	187(44.1)	47(11.07)	1(0.23)
Do you think at least once in a year training should be given to us on occupational health and safety	74(17.5)	126(29.7)	160(37.7)	52(12.3)	12(2.8)

Table 2: Association between the knowledge and socio demographical variable of the respondents (n=424)

Variables	Categories	Knowledge		X ² value	P-value
		Good	Poor		
Age	16-21 Years	128(42.5)	15(12.2)	41.780	.000
	22-27	147(48.8)	80(65.0)		
	Above 27	26(8.6)	28(22.8)		
Educational level	Illiterate	56(18.6)	4(3.3)		

	Primary	105(34.9)	13(10.6)	61.211	.000
	SSC	97(32.2)	85(69.1)		
	HSC	43(14.3)	21(17.1)		
Residence	Rural	232(77.1)	69(56.1)	18.661	.000
	Urban	69(22.9)	54(43.9)		
Marital status	Single	177(58.8)	74(60.2)	.067	.796
	Married	124(41.2)	49(39.8)		
Monthly family income	<10,000TK	72(23.9)	15(12.2)	13.853	.001
	10,000-20,000TK	175(58.1)	95(77.2)		
	>20,000TK	54(17.9)	13(10.6)		
Do you smoke	Yes	219(72.8)	95(77.2)	.911	.340
	No	82(27.2)	28(22.8)		
What is employment status	Employer	84(27.9)	36(29.3)	28.318	.000
	Paid permanent	217(72.1)	76(61.8)		
	Paid casual	0(0.0)	11(8.9)		
Have you had any problems	Yes	80(26.6)	64(52.0)	25.226	.000
	No	221(73.4)	59(48.0)		
Does exposure to metal dust cause problems on health	Yes	273(90.7)	110(89.4)	.160	.689
	No	28(9.3)	13(10.6)		
Does the sound create during cutting metal cause problems on health	Yes	288(95.7)	73(59.3)	106.380	.000
	No	0(0.0)	34(27.6)		
	Don't Know	13(4.3)	16(13.0)		
Does radiation during welding cause problems to health	Yes	170(56.5)	43(35.0)	16.174	.000
	No	54(17.9)	33(26.8)		
	Don't Know	77(25.6)	47(38.2)		
Does wearing safety glasses or goggles can protect the eye from radiation during welding	Yes	232(77.1)	85(69.1)	6.440	.040
	No	13(4.3)	13(10.6)		
	Don't Know	56(18.6)	25(20.3)		
exposure to chemicals (inhaled sprays, spilled on body) during work cause problem on health	Yes	116(38.5)	22(17.9)	23.212	.000
	No	31(10.3)	29(23.6)		
	Don't Know	154(51.2)	72(58.5)		
Do all types of gloves provide the same level of protection	Yes	57(18.9)	0(0.0)	37.054	.000
	No	39(13.0)	6(4.9)		
	Don't Know	205(68.1)	117(95.1)		
Does exposure to chemicals (inhaled sprays, spilled on body) during work cause problems on health	Yes	123(40.9)	12(9.8)	62.141	.000
	No	114(37.9)	41(33.3)		
	Don't Know	64(21.3)	70(56.9)		
What do you think damage by electricity can be considered a potential hazard in the workshop	Yes	228(75.7)	15(12.2)	150.872	.000
	No	19(6.3)	47(38.2)		
	Don't Know	54(17.9)	61(49.6)		
What do you think Carrying a larger load than you are able can be considered a potential hazard in the workshop	Yes	219(72.8)	74(60.2)	18.451	.000
	No	82(27.2)	43(35.0)		
	Don't Know	0(0.0)	6(4.9)		

Table 3: Association between the Practice and socio demographical variable of the respondents (n=424)

Variables	Categories	Practice		X ² value	P-value
		Good	Poor		
Age	16-21 Years	103(33.4)	40(34.5)	.338	.845
	22-27	164(53.2)	63(54.3)		
	Above 27	41(13.3)	13(11.2)		
Educational level	Illiterate	43(14.0)	17(14.7)	13.055	.005
	Primary	88(28.6)	30(25.9)		
	SSC	120(39.0)	62(53.4)		
	HSC	57(18.5)	7(6.0)		
Residence	Rural	214(69.5)	87(75.0)	1.247	.264
	Urban	94(30.5)	29(25.0)		
Marital status	Single	174(56.5)	77(66.4)	3.409	.065
	Married	134(43.5)	39(33.6)		
Monthly family income	<10,000TK	64(20.8)	23(19.8)	.069	.966
	10,000-20,000TK	195(63.3)	75(64.7)		
	>20,000TK	49(15.9)	18(15.5)		
Do you smoke	Yes	218(70.8)	96(82.8)	6.294	.012
	No	82(27.2)	28(22.8)		
What is employment status	Employer	71(23.1)	49(42.2)	18.081	.000
	Paid permanent	226(73.4)	67(57.8)		
	Paid casual	11(3.6)	0(0.0)		
Have you had any problems	Yes	88(28.6)	56(48.3)	14.588	.000
	No	220(71.4)	60(51.7)		
Do you use personal protective equipment	Yes	215(69.8)	80(69.0)	.028	.867
	No	93(30.2)	36(31.0)		
Do you agree to wear PPE with own cost	Yes	176(57.1)	0(0.0)	113.32	.000
	No	132(42.9)	116(100.0)		
Have you ever had an injury on duty	Yes	145(47.1)	12(10.3)	48.762	.000
	No	163(52.9)	104(89.7)		
Are you comfortable when using PPE	Yes	210(68.2)	38(32.8)	43.550	.000
	No	98(31.8)	78(67.2)		
Do you buy new PPE when your PPE was lost	Yes	185(60.1)	22(19.0)	56.966	.000
	No	123(39.9)	94(81.0)		
Do you encourage the worker to use PPE	Yes	278(90.3)	87(75.0)	16.380	.000
	No	30(9.7)	29(25.0)		

Table 4: Multivariate analysis of factors associated with knowledge of Occupational health and safety among the respondents (n=424)

Variables	Categories	Knowledge		OR (95%CI)	P-value
		Good	Poor		
Residence	Rural	232(77.1)	69(56.1)	6.012(2.938-12.303)	.000
	Urban	69(22.9)	54(43.9)		
Marital status	Single	177(58.8)	74(60.2)	.269(.134-.542)	.000
	Married	124(41.2)	49(39.8)		
Monthly family income	<10,000TK	72(23.9)	15(12.2)	15.16(4.286-53.67)	.000
	10,000-20,000TK	175(58.1)	95(77.2)		
	>20,000TK	54(17.9)	13(10.6)		

Do you smoke	Yes	219(72.8)	95(77.2)	.107(.045-.252)	.000
	No	82(27.2)	28(22.8)		
Does exposure to metal dust cause problem on health	Yes	273(90.7)	110(89.4)	1.126(.479-2.644)	.786
	No	28(9.3)	13(10.6)		
Does radiation during welding cause problem on health	Yes	170(56.5)	43(35.0)	9.673(4.543-20.59)	.000
	No	54(17.9)	33(26.8)	3.162(1.298-7.702)	.011
	Don't Know	77(25.6)	47(38.2)		
Does wearing safety glasses or goggles can protect the eye from radiation during welding	Yes	232(77.1)	85(69.1)	1.388(.657-2.932)	.390
	No	13(4.3)	13(10.6)	.102(.031-.331)	.000
	Don't Know	56(18.6)	25(20.3)		
exposure to chemicals (inhaled sprays, spilled on body)	Yes	116(38.5)	22(17.9)	4.173(2.048-8.504)	.000
	No	31(10.3)	29(23.6)	.241(.098-.589)	.002
	Don't Know	154(51.2)	72(58.5)		

Table 5: Multivariate analysis of factors associated with Practice of Occupational health and safety among the respondents (n=424)

Variables	Categories	Practice		OR(95%CI)	P-value
		Good	Poor		
Residence	Islam	214(69.5)	87(75.0)	1.021(.460-2.268)	.959
	Hindu	94(30.5)	29(25.0)		
Marital status	Single	174(56.5)	77(66.4)	.714(.313-1.627)	.422
	Married	134(43.5)	39(33.6)		
Monthly family income	<10,000TK	64(20.8)	23(19.8)	13.06(2.97-57.31)	.001
	10,000-20,000TK	195(63.3)	75(64.7)	3.60(1.162-11.14)	.026
	>20,000TK	49(15.9)	18(15.5)		
Do you smoke	Yes	218(70.8)	96(82.8)	.070(.025-.196)	.000
	No	90(29.2)	20(17.2)		
Do you use personal protective equipments	Yes	215(69.8)	80(69.0)	.867(.447-1.680)	.672
	No	93(30.2)	36(31.0)		
Have you ever had an injury on duty	Yes	145(47.1)	12(10.3)	34.405(13.652-86.702)	.000
	No	163(52.9)	104(89.7)		
Are you comfortable when using PPE	Yes	210(68.2)	38(32.8)	15.996(7.217-35.454)	.000
	No	98(31.8)	78(67.2)		
Do you buy new PPE when your PPE was lost	Yes	185(60.1)	22(19.0)	25.920(11.219-59.888)	.000
	No	123(39.9)	94(81.0)		
Do you encourage the worker to use PPE	Yes	278(90.3)	87(75.0)	2.233(.968-5.150)	.060
	No	30(9.7)	29(25.0)		

DISCUSSION

The study aimed to estimate the level of knowledge, attitude, and preventive practices of occupational health and safety among the metal workers in Bogura, Bangladesh. Results of the current study we found that majority of the participants (71%) knew about occupational health and safety. Other studies from Ethiopia, Kenya,

and Hong Kong also report similar results. In an investigation for awareness of occupational hazards and associated factors among welders in Lideta Sub-City, Addis Ababa, Ethiopia it was also reported that 86.5% of respondents knew occupational hazards (Tadesse et al., 2016). But interestingly (61.6%) of the respondents had a favorable attitude and the majority (27.4%) of the respondents had poor practice about occupational

health and safety. which is similar to another study that was conducted in Hawassa, Ethiopia they also found that majority of the participants (95.2%) had favorable attitude related to OHS especially on monitoring the use of PPE 337 (95.2%) and (26.3%) of the respondent had poor practice. Hence it is valuable for policy makers and clinicians to inform future services.

Most workers had good knowledge on electrical hazards, 228 (75.7) and accident prevention, 57 (18.9) when compared to the other knowledge questions. The study had revealed that 69.9% of respondents knew personal protective equipment; a nearly similar result was reported from a study conducted in India among garment workers, 75.2%, and Adwa textile factory workers, 72.3% (Desalegn et al., 2014; Parimalam et al., 2007).

There is a clear gap between knowledge and practice in this study. An example of this can be some 90.3% of the respondents understood that wood work and metal work can cause harmful effects to health but only 58% of respondents reported using eyeglass always. The use of the other PPE was even less than that. A study from Hong Kong also reported about 86.6% of the management team respondents and about 48.6% of the frontline construction workers responded that they did not use respirators (Tam et al., 2008) which are in line with findings of this work. Similarly, a low rate of observed PPE use, 11.8%, was reported in the Kenyan study (Chepkener, 2013). Among farm workers in Gaza stripes also, the highest use of PPE was reported to be 21.7% oral-nasal masks (Yasin, 2002).

Red-eye which was found to be the highest prevalent (21.5%) complaint in this study was similarly the most prevalent complaint in the study conducted among Akaki textile factory workers (Kumie et al., 2016). Cough is associated with dust and therefore, wherever there is dust at the workplace it is expected to be highly prevalent.

The prevalence of physical injuries in this study was 24%. A slightly higher rate of overall occupational injury prevalence in the previous year 43.7% was reported among Addis Ababa city municipal solid waste collectors (Bogale et al., 2014). Another study from Southwest Ethiopia

reported a prevalence of occupational injury of 45.2% per year among Small Scale Industry Workers (Meleko et al., 2014). Similarly in another city in Northern Ethiopia (Meqelle) an annual occupational injury among Small Scale Industry Workers was reported to be 58.2% (Berhe et al., 2015).

Workers' awareness of occupational hazards was dependent on their increased level of educational attainment. This agrees with the study conducted in Nigeria (Sabitu et al., 2009). This might be because workers who attained a higher level of education could tend to change available information into the mature stage which increased their awareness of hazards. Thus, the findings of this study will be useful to public health authorities, researchers, and clinicians who have a role in the developing and increasing level of knowledge, attitude, and preventive practices of occupational health and safety among the metal workers in Bangladesh.

CONCLUSION

This study highlights poor knowledge and poor practice about occupational health and safety among the metal workers in Bangladesh the prevalence of occupational injury was high among the metal workers and the proportion of welders using protective measures was low. Despite its public health importance, there are no effective programs in Bangladesh to increase the level of knowledge and preventive practices of occupational health and safety and hence the risk of disease and death. The level of experience, training, and attitude while working can reduce injuries dramatically. Health education, promotion of screening programs, and raising awareness about proper utilization of PPE is the most cost-effective approach in reducing the incidence of injury and health problems in resource-crunched societies like Bangladesh.

Recommendations

1. Regular training should be implemented for the metal workers.
2. Awareness and safety intervention programs to be advocated to minimize occupational injury among welding workers.

3. It is recommended for the welding enterprises to implement a system for safety incentives for the welders. It may not necessarily be the best tool to enhance compliance with occupational health and safety practices at the welding sites, but some form of incentive is important.
4. The government and the engineering societies should play a major role to apply the safety rules by issuing the regulations, standards, and codes and legally enforcing the welding enterprises to follow them with adequate strict penalties for noncompliance.
5. Further research should be done to assess knowledge and practice on the health and safety outcomes and other components of safe practices.

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