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Utilization Pattern of Personal Protective Equipment among Industrial Workers of Nawalparasi, Nepal

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Abstract

Introduction: With industrialization, radical alterations in the life of many rapidly developing countries are visible. Lack of well designed and appropriate safety measures leads to serious adverse health consequences to the workforce. The concept of occupational safety and health is still new in Nepal. The main objective of the study was to assess the utilization of personal protective equipment among industrial workers in Chaudhary Group Industrial Estate, Nawalparasi.

Methods: A descriptive, cross-sectional study was carried out among 187 workers of five industries (Beer, Rio, Chesseball, Chips and Wafer) of Chaudhary Group Industrial Estate, Nawalparasi.

Results: Mean age of the workers involved was 34.09 years (SD: ±8.650). Nine out of ten (87.2%) workers used any kind of PPE while working in worksite. Association of use of personal protective equipment with gender and encourage to use of personal protective equipment were statistically significant while income, educational status, age and working experience remained in-significant.

Conclusion: Majority of the workers used the personal protective equipment in Chaudhary Group of Industry. All workers of the industry should be aware on the use of personal protective equipment to get protected from any kind of adverse health effects/hazards during while working in the industry.

Keywords: Personal Protective Equipment; occupational hazard; knowledge; attitude; practice.

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Introduction

Occupational health and safety (OHS) is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goals of occupational health and safety programs include fostering a safe and healthy work environment (1).

Personal protective equipment is one of the important measures to safeguard workers from exposure to occupational hazards. It includes Face Mask, Goggle, Helmet, Gloves, Boot, Ear Plugs, Protective clothing, Belts, etc. It is said that workplace controls are better than Personal protective equipment (PPE), however, during the process of working in the industry, it is necessary to use PPE. The workers need to determine the appropriate PPE for each hazard and to train them on when and how to use PPE. Additionally, there are lots of different situations and in each situation, workers need different kind of PPE.

The use of PPE usually implies that the worker is expected to operate in a potentially hazardous environment with the protective device as one of the key means of preventing exposure (2). Physical hazards, which can adversely affect health, include noise, vibration, ionizing and non-ionizing radiation, heat and other unhealthy conditions. Accidents and physical and chemical agents, dusts, heavy physical work are the main problems in manufacturing industries.

Statement of problem

Nepal is a developing country where various types of industries are in extending order. All over Nepal there are varieties of industries. Each year, approximately 20,000 workers suffer from accidents at workplace which lead to about 200 lives lost in Nepal. Many incidents have been reported in manufacturing industries where large numbers of workers were injured due to the lack of safety provisions. Nepalese workers are suffering from one or more problems in their workforce (2).

It is estimated that more than 250 million workers meet occupational accidents and 160 million are suffering from occupational diseases each year at the global level. Every day, more than 6000 people/workers die, equivalent with one death per 15 seconds, because of the accident and illness related to work in the work places (3).

Occupational and Industrial accidents/hazards are all caused by preventable factors which could be eliminated by implementing available measures such as PPE. This

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is demonstrated by continuously reduced accident rates in industrialized countries (4). Limited researches have been conducted on this topic. Thus, this study will help to assess the current practice of personal protective equipment among the workers and helps to identify the loopholes.

We aimed to assess the use of personal protective equipment among the workers of Chaudhary Group Industry of Nawalparasi district of Nepal.

Methods

A descriptive, cross-sectional study was carried out in five industries (Beer, Rio, Chesseball, Chips and Wafer) of the Chaudhary Group Industrial Estate, Nawalparasi from October 20, to November 2013. A total of 187 workers were determined based on the use of personal protective equipment (PPE) in Vishakhapatnam plant of India (5). Following, stratified random sampling, the required number of study population were selected proportionately (49%) from each industry. The selected respondents were having working experience more than one year with age between 16-60 year. Age, gender, working experiences, income, educational status, encourage to use PPE were considered as independent variables whereas PPE practices as dependent variable.

Ethical approval was taken from Ethical Review Board of Pokhara University and Chaudhary Group of Industry. Verbal consent was taken from each respondents and the confidentiality of the information was maintained. Questionnaire was pretested and back translated English to Nepali language. Face-to-face interview was used as a technique for data collection and analysis were done by SPSS version 17. Descriptive analysis was done to determine the use of PPE. Chi-square test was applied to findout the association between the dependent and independent variables.

Results

Socio-demographic information

Majority of the respondents (70.6%) were within the age group of 20-40 years with mean age of 34.09 ±8.650 years. Results showed that majority of respondents were male (68.4%) but use of PPE was found higher in female respondents (31.6%) as compared to male respondents. Workers of age group (30-40 years) and workers with income (less than 11450 per month) were more likely to use PPE compared to others. The majority of the respondents were literate (87.1%).

Provision of formal information and health checkup

Most of the respondents (61.5%) told that there is no any provision of regular health checkup in the industry. Only 46 (24.6%) had ever been formally taught or been advised in using PPE in the workplace. Similarly, 56.5% told that they had received the formal information regarding PPE, before one month.

Use of personal protective equipment

The maximum proportion (87.2%) workers used any kind of PPE in the industry. Most of the workers (68.1%) regularly used all relevant PPE in work. More than half (57%) respondents used the PPE when they needed, 35% respondents used PPE all the time during working and only 8% respondents used PPE only in the starting time of the work. Main reasons for not using PPE were unavailability of PPE (33.3%) and no necessity of using PPE felt (66.7%). **(Table 1)**

Most of the respondents used respirators/mask (78.1%), hand protectors/gloves (56.7%), while, 30.5% usedapron/clothing, head protectors/helmet (26.7%), eye protectors/goggles (26.7%) and 17.1% used foot protectors/boot. **(Table 2)**

The results showed that 88.4% workers used any type of PPE in Beer industry, 79.4% in Rio industry, 96.4% in Wafer industry, 91.3% in chips industry and 75% workers in cheeseball industry to ensure health, food and body safety in workplace. **(Table 3)**

Perception of workers regarding PPE practices in industry

A great number of workers (95.7%) told that there is the regular provision of replacement of the worn-out, infected PPE. A three-fourth (77.3%) workers didn't feel uncomfortable while using PPE whereas 22.7% workers feel uncomfortable while using PPE in industry. Most of the workers (89.3%) were encouraged by their co-staffs and officers to use PPE while, 10.7% workers weren't encouraged.

Perceived benefits of using PPE

Of the PPE users, 18.4% told they perceived health safety as benefits through the use of PPE while, 40.5% told body protection as perceived benefit, 21.5% told prevention from diseases as perceived benefit and 15.9% told prevention from dust, fumes, chemicals etc. as perceived benefit. A nominal told food safety (3.1%) and prevention from

Table 1: PPE use related variables

Variable	Frequency (%)
Use of PPE	
Yes	163 (87.2%)
No	24 (12.8%)
Started using PPE since joining the industry?	
Yes	130 (68.1%)
No	33 (20.2%)
Use PPE regularly?	
Yes	111 (68.1%)
No	52 (31.9%)
Use of PPE during working	
Start of working	13 (8.0%)
All the time while working	57 (35.0%)
Only if needed	93 (57.0%)
Barriers behind not using PPE	
Not available	8 (33.3%)
Not necessary	16 (66.7%)

Table 2: Type of PPE used (n=163)

Type of PPE	Frequency (%)*
Respirators/masks	146 (78.1%)
Hand protectors/gloves	106 (56.7%)
Eye protectors/goggles	50 (26.7%)
Foot protectors/boot	32 (17.1%)
Head protectors/helmet	50 (26.7%)
Appron/clothing	57 (30.5%)

** multiple response type*

Table 3: Industry-wise practice of PPE among workers (n=187)

Industries	Use of PPE	
	Yes (%)	No (%)
Wafer	27 (96.4%)	1 (3.6%)
Cheeseball	12 (75.0%)	4 (25.0%)
Beer	76 (88.4%)	10 (11.6%)
Chips	21 (91.3%)	2 (8.7%)
Rio	27 (79.4%)	7 (20.6%)

Table 4: Perceived benefits of PPE (n=163)

Perceived benefits	Frequency (%)*
Body protection	66 (40.5%)
Prevention from diseases	35 (21.5%)
Health safety	30 (18.4%)
Prevention from dust fumes, chemicals	26 (15.9%)
Food safety	5 (3.1%)
Prevention from injuries/ accidents	1 (0.6%)

Table 5: Health problems/hazards faced (n=60)

Health problems/hazards	Frequency (%)
Accidents/injuries	36 (60.0%)
Musculo-skeletal problems	11 (18.3%)
Eye problems	5 (8.3%)
Skin problems	3 (5.0%)
Ear problems	1 (1.7%)
Others	4 (6.7%)

Table 6: Factors associated with the use of PPE in industry

Variable	Use of PPE		χ^2 (Pearson chi-square)	Odds ratio	p-value
	Yes (%)	No (%)			
Gender					
Female	56 (94.9%)	3 (5.1%)	4.627	3.65	0.023*[a]
Male	107 (83.6%)	21 (16.4%)			
Age					
< 30 years	62 (86.1%)	10 (13.9%)	5.291	-	0.071
30-40 years	62 (93.9%)	4 (6.1%)			
>40 years	39 (79.6%)	10 (20.4%)			
Educational status					
Illiterate	23 (95.8%)	1 (4.2%)	1.849	-	0.126[a]
Literate	140 (85.9%)	23 (14.1%)			
Monthly income					
≤11450	119 (89.5%)	14 (10.5%)	2.193	1.932	0.109[a]
≥11451	44 (81.5%)	10 (18.5%)			
Years of working					
< 5 years	88 (86.4%)	14 (13.7%)	2.996	-	0.445
5-10 years	33 (89.2%)	4 (10.8%)			
11-15 years	34 (91.9%)	3 (8.1%)			
>15 years	8 (72.7%)	3 (27.3%)			
Encourage to use PPE					
Yes	156 (93.4)	11 (6.6%)	54.477	26.338	0.001**[a]
No	7 (35.0%)	13 (65.0)			

*significant, **highly significant, [a]Fisher's exact test

injuries/accidents (0.6%) as perceived benefit. **(Table 4)**

Health problems/hazards faced by respondents

Out of 187 respondents, 60 (32.1%) workers had faced any type of health problems or hazards while working in the industry. Most of the workers suffered from accidents/ injuries followed by muscolo-skeletal problems, eye problems, skin problems, ear problems, typhoid, blood pressure and respiratory problems within last one year of duration. **(Table 5)**

Factors associated with the use of PPE

Association of use of PPE with gender (p=0.031) and encourage to use PPE (p=0.001) were statistically significant whereas association of use of PPE with income (p=0.109), education status (p=0.126), age (p=0.071) and working experience (p=0.445) were in-significant. Female respondents were likely to use PPE as compared to male respondents. Respondents who were encouraged to used PPE were 26 times more likely to use PPE as compared to non-motivated ones. **(Table 6)**

Discussion

Three out of ten (32.1%) workers had faced any type of health problems or hazards under working conditions in industry. The main causes of the health problems/hazards were due to the work load (75%), chemicals, dust, fumes (18.3%) and lack of PPE provision (6.7%). Similar study conducted among cement workers in Arab Emirates showed that only 52.9 % of the workers knew the hazards other than the dust that were associated with their work (1).

In this study, only 12.8% workers didn't use any types of PPE available in the workplace. Study conducted in Vishakapatnam Steel plant of India showed that 27.50% of the workers were using PPE (5). A study carried in a sample of 501 male printing workers from 28 factories in Hong Kong showed that 22.05% of workers were using PPE (6). Another study among dyes printing workers found that 34% of the workers were using PPE (7).

Only 12.8% workers didn't use any kind of PPE in Chaudhary Group of Industry. The main barriers to non use of PPE were non-availability (33.3%) whereas rest told unnecessary (66.7%) to using PPE, while working in industry. Similarly, another study among garment workers in Tamilnadu of India found non-availability (18%) as the reasons for non use of PPE (8).

Statistics of this study shows significant association of gender of the respondents, encourage to use PPE, with the use of PPE. Similar finding from the study among garment workers in Tamilnadu in India showed the significant association between encouragement to use PPE by officers/staffs with the use of PPE. It has been recommended that the workers need to be trained for proper use of PPE to reduce the occupational health hazards (8).

Still another study on usage of PPE found that 29% of the respondents have ever used at least one kind of PPE (71% didn't use any kind of PPE). The majority of the Craftsman were not using PPE because they believed using of PPE was uncomfortable. In our study, however, more than two quarters didn't feel any uncomfortable using PPE that might influence the increase in the use of PPE in workplace (9).

A three-fourth (75.4%) had never been formally taught or been advised in using PPE. A Study from Canada showed that 22% workers never received PPE training and 32% were not trained in the previous 2 years (10).

Study suggested that regular public health education and training programs including how to use appropriated PPE should be organized for workers to improve their ability to handle practices and health (11).

Study conducted in Saudi Arab showed that 12% used PPE all the time while, 60% did not use any type of PPE. The main reasons given for not using PPE were non-availability of equipment and that the equipment was too heavy causing inconvenience. A variety of preventive measures and PPE were mentioned, their use however, was unsatisfactory (12).

We found comparatively good practice of PPE when compare with other similar studies. It might be due to the workers knowledge on PPE, training regarding PPE, types of industries were research were conducted, provision of PPE, incidence of health hazards/problems, workplace environment, years of experience of working in industry which have been clearly illustrated as above.

In developing countries like Nepal, there are high industrial hazards due to low use of PPE. Improper utilization of PPE in the workplace in our country leads to various health hazards. In case of Chaudhary Group of Industry, there is a maximum industrial hazards such as physical, chemical, mechanical. Musculo-skeletal pain, respiratory problems, burning, dermatological problems are common. This will finally help the industrial management to formulate new policies regarding PPE use, thereby limiting occupational hazards.

Conclusions

It is found that majority of workers (more than three-quarters) use the PPE in Chaudhary Group of Industry, Nawalparasi. Increase in the safe practices of PPE promotes the workplace safety and workers health status. Formal information, education and training on proper uses of PPE should be provided to reduce the workplace hazards. Further studies are needed to assess industrial health risks.

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