Original Research Article

A Study on Awareness and Use of Personal Protective Equipment (PPE) Among Factory Workers Of GIDC Dared, Jamnagar city, Gujarat

Savalia Malay[1], Mehul Patel[2*],Bhavesh Prajapati[3]

[1]Tutor, Department of Community Medicine, Dr. N. D. Desai Faculty of Medical Science and Research, Nadiad, Gujarat, India

[2]Assistant Professor, Department of Community Medicine, Dr. N. D. Desai Faculty of Medical Science and Research, Nadiad, Gujarat, India

[3]Tutor, Department of Community Medicine, Dr. N. D. Desai Faculty of Medical Science and Research, Nadiad, Gujarat, India

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Abstract

Background: The proper use of safety measures by workers is an important way of preventing and/or reducing a variety of health hazards that they are exposed to during work. There is a lack of knowledge about hazards and personal protective equipment (PPE) and the use of PPE among the workers in industries of Dared GIDC is limited. **Objectives:** We designed a study to assess workers' awareness of hazards and PPE, and the use of PPE among the workers of industries of Dared GIDC and to find a possible correlation between awareness and use of PPE among them. **Methodology:** A cross-sectional study was conducted from September 2018 to November 2018.Total 640 subjects were selected by simple random sampling after conducting a pilot study, who provided data via the completion of a structured questionnaire. **Results:** As there are more chances of accidents in industrial set up, injuries due to accidents can be prevented by proper use of PPE during work. But the results indicate that only 45.16% workers knew about health hazards related to their occupation. Only 43.75% workers knew that these hazards could be prevented by use of PPE. Out of all only 38.6% workers were actually using PPE. **Conclusion:** The workers using PPE were those who were aware of hazards and PPE. There is a gap between being aware of hazards and use of PPE at work.

Keywords: PPE, Factory workers, awareness

Introduction

Hazard exists in every work place in different forms.[1] Workplace injuries are a leading cause of substantial disabilities globally.[2] There exist various kinds of physical, chemical, and biological hazards in the workplace. To protect workers from these hazards, it is not controversial that environmental management measures to remove or reduce these harmful factors and to improve the quality of workplaces through an engineering approach are fundamental solutions.[3] Safe practices depend on having an appropriate attitude toward the health risks associated with exposure to mechanical activities, which in turn depends on knowledge about the danger and harmful effects of mechanical activities. Surprisingly, in most developing countries, health and safety considerations at industrial facility are not a priority, and the use of safety measures is considered a burden.[4] Millions of workers are occupationally exposed to industrial hazards in the world, but little is known about their knowledge of and attitude towards those effects. There is a great concern that workers should be aware of the adverse effects of various hazards if not handled properly as they are exposed to the same with no control over the length and frequency of exposure.[5]

The use of appropriate and good quality personal protective equipment in workplaces cannot be over emphasized. One has to identify the roles of the employer of labour and those of the employee in reducing workplace hazards and consequently achieving a healthy workplace environment. Indeed protection of workers from workplace hazards is crucial to reduce mortality and morbidity in the workplace.[6] Besides other control measures it becomes important to assess compliance of the employer/employee with personal protective equipment (PPE). Personal Protective Equipment (PPE) or Personal Protective Devices (PPDs) are designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.[6]The type of Personal Protective Equipment include safety helmet, face mask, head cap, safety shoes, goggles, gloves, fire resistant coat, ear muffs and ear plugs, dust mask, safety belts, paper nose mask for protecting head, face, eyes, hands and arms, feet and whole body.[7] Without the proper use of PPE many workers are affected by disabling work related injuries. To avoid these types of accidents PPE should be reliable and smart.[1] It is mandatory for employers to protect their employees from work place hazards that can cause injury. Controlling a hazard at its workplace is the best way to protect the employees. First step in the effective use of PPE is hazard assessment. The employees have to identify physical and chemical hazards in work place. The lists of potential hazards are impact, penetration, compression, chemical, heat/cold, harmful dust, light (optical radiation) and biologic matters.[1]

Several questions are therefore raised

**Correspondence*
Dr. Mehul Patel
Assistant Professor, Department of Community Medicine, Dr. N. D. Desai Faculty of Medical Science and Research, Nadiad, Gujarat, India
E-mail: drmehul007@gmail.com

Do the workers know about workplace hazards? Do they know the appropriate PPE and how to use them? What is their attitude to and utilization of these PPE? What factors influence utilization of these PPE? Has the employer done everything by providing PPE and educating the employee on work hazards and how to use PPE? If yes then why are some factory workers not wearing them?

The relevance of this study is to assist in highlighting what gap exists between the employer and utilization of the PPE by factory workers.

Objectives

We have designed a study to assess:

- Workers' awareness about hazards and PPE.
- Use of PPE among the workers of industries of Dared GIDC.
- To find association between awareness and use of PPE among them.

Materials and Methods

A cross sectional study was conducted during September 2018 to November 2018 at industrial area of Dared, Jamnagar. A pilot study was done prior to conducting the actual study for knowing the prevalence of use of PPE among industrial workers. According to pilot study around 40% of workers were using personal protective equipment. Taking this into consideration with precision level of 4% and considering non-response rate around 10% the final sample size was 634, which was rounded off to 640. Simple random sampling method was used first to select the industries and then again to select workers for the study. Pre-informed, pre-tested, semi-structured proforma was used as a study tool. Informed consent was taken prior to obtaining information regarding the study. Workers who did not give the consent were excluded from the study.Data entry and data analysis was done in Microsoft Excel 2007 software. Descriptive analysis was done for all predictor and outcome variables. Chi square test was applied to find association between predictor and outcome variables.The ethical approval was obtained from the institutional ethical committee before conducting the study.

Results

Table 1: Age and sex wise distribution of factory workers

Age Group	Male		Female		Total	
	No.	%	No.	%	No.	%
15-34	381	71.08%	62	59.62%	443	69.22%
35-54	138	25.75%	37	35.58%	175	27.34%
55-74	17	3.17%	5	4.81%	22	3.44%
Total	536	100.00%	104	100.00%	640	100.00%

Table 1 shows that out of 640 workers 443 (69.22%) were in the age group of 15-34 years, followed by 175 (27.34%) in the age group of 35-54 years and 22 (3.44%) in the age group of 55-74 years. Observation also shows that out of 640 workers 536 (83.75%) were males and 104 (16.25%) were females.

Table 2: Association of demographic variables with use of PPE

Variables	Use of PPE			Chi Square	*df*	*p* value
	Yes (%)	No (%)	Total (%)			
Age						
15-34	149 (33.63%)	294 (66.37%)	443 (100%)	15.849	2	0.0004
35-54	85 (48.57%)	90 (51.43%)	175 (100%)			
55-74	13 (59.09%)	9 (40.91%)	22 (100%)			
Sex						
Male	218 (40.67%)	318 (59.33%)	536 (100%)	6.009	1	0.0142
Female	29 (27.88%)	75 (72.12%)	104 (100%)			
Education						
Primary	78 (33.19%)	157 (66.81%)	235 (100%)	10.315	2	0.0057
Secondary	114 (38.26%)	184 (61.74%)	298 (100%)			
Higher secondary or more	55 (51.4%)	52 (48.6%)	107 (100%)			

Table 2 shows that out of 443 workers from 15-34 years of age group, 149 (33.63%) were using PPE and 294 (66.37%) were not using any PPE. Similarly out of 175 and 22 workers from age group 35-54 and 55-74 years respectively, 85 (48.57%) and 13 (59.09%) were using PPE, respectively. Observed difference was statistically highly significant. On looking sex wise distribution, out of 536 males, 218 (40.67%) were using PPE and 318 (59.33%) were not using any PPE. Out of 104 females, 29 (27.88%) were using PPE and 75 (72.12%) were not using any PPE. Observed difference was statistically significant. Education wise distribution depicts that out of 235 workers who had primary level education, 78 (33.19%) were using PPE and 157 (66.81%) were not using any PPE. Further, out of 298 and 107 workers who had education up to secondary level and higher secondary or more level respectively, 114 (38.26%) and 55 (51.4%) were using PPE, respectively. Observed difference was statistically significant.

Table 3: Association of work and health related variables with use of PPE

Variables	Use of PPE			Chi Square	*df*	*p* value
	Yes (%)	No (%)	Total (%)			
Type of Industry						
Metal	204 (36.43%)	356 (63.57%)	560 (100%)	8.862	1	0.0029
Others	43 (53.75%)	37 (46.25%)	80 (100%)			
Type of work						
Machinery	148 (34.1%)	286 (65.9%)	434 (100%)	11.482	1	0.0007
Others	99 (48.06%)	107 (51.94%)	206 (100%)			

Working for how many years						
1-3	139 (35.01%)	258 (64.99%)	397 (100%)	13.42	3	0.0038
4-6	49 (37.98%)	80 (62.02%)	129 (100%)			
7-9	23 (43.4%)	30 (56.6%)	53 (100%)			
10 or more	36 (59.02%)	25 (40.98%)	61 (100%)			
Knowledge of health related consequences for particular occupation						
Yes	218 (75.43%)	71 (24.57%)	289 (100%)	301.753	1	< 0.0001
No	29 (8.26%)	322 (91.74%)	351 (100%)			
Knowledge about precautions to be taken to prevent pre-mentioned consequences						
Yes	213 (76.07%)	67 (23.93%)	280 (100%)	295.02	1	< 0.0001
No	34 (9.44%)	326 (90.56%)	360 (100%)			

Table 3 shows that out of 560 workers working in metal industry 204 (36.43%) were using PPE and 356 (63.57%) were not using any PPE. In addition to that out of 80 workers working in other industries 43 (53.75%) were using PPE and 37 (46.25%) were not using any PPE. Observed difference was statistically significant. Looking at type of work done by workers, out of 434 workers working with machinery, 148 (34.1%) were using PPE and 286 (65.9%) were not using any PPE. While out of 206 workers doing other than machinery work, 99 (48.06%) were using PPE and 107 (51.94%) were not using any PPE. Observed difference was statistically highly significant. Work experience wise distribution of workers shows that out of 397 workers having work experience of 1-3 years, 139 (35.01%) were using PPE and 258 (64.99%) were not using any PPE. Similarly out of 129, 53 and 61 workers having work experience of 4-6, 7-9 and 10 or more years respectively, 49 (37.98%), 23 (43.4%) and 36 (59.02%) were using PPE, respectively. Observed difference was statistically significant.

Table 3 also shows that out of 289 workers having knowledge of health related consequences for their occupation, 218 (75.43%) were using PPE and 71 (24.57%) were not using any PPE. In addition to that out of 351 workers not having any knowledge of health related consequences for their occupation, 29 (8.26%) were using PPE and 322 (91.74%) were not using any PPE. Observed difference was statistically highly significant. Furthermore out of 280 workers having knowledge about precautions to be taken to prevent pre-mentioned consequences related to their occupation, 213 (76.07%) were using PPE and 67 (23.93%) were not using any PPE. Out of 360 workers not having any knowledge about precautions to be taken to prevent pre-mentioned consequences related to their occupation, 34 (9.44%) were using PPE and 326 (90.56%) were not using any PPE. Observed difference was statistically highly significant.

Discussion

Present study set out to assess the use of PPE among workers in various industries in a developing country setting. This is because proper use of appropriate PPE is an important standard precaution in preventing workplace hazards. One of the key problems with the use of personal protective equipment is that it places a great deal of emphasis on the user. It is important that employers and employees have basic knowledge about the potential hazards at work, the length of time for which the device would be expected to perform at a known level of protection, and the proper use and precaution of the equipment in use.[7] Despite the importance of PPE in prevention of workplace hazards, deliberate efforts have not been made by employers to educate their workers on their use. Present study observed that most of the workers had heard of PPE but only a few could define it.Earlier study on knowledge, attitude, and practice regarding organic solvents among 501 printing workers in 28 factories in Hong Kong revealed a low level of knowledge (20.4%), appropriate attitude (38.4%), and safe practice (22%) among the workers.[8] Safe practice did not depend on knowledge and attitude but was positively associated with being informed of safety precautions and being supplied with chemical information by supervisors. Another study on knowledge, attitude and practices related to occupational health problems among salt workers working in the desert of Rajasthan, India also reported a huge gap between the knowledge and practice of salt workers with protective devices.[9] KAP related to occupational health problems among garment workers in Tamil Nadu, India, revealed that the workers employed in the three sections had high levels of knowledge of health problems, but the knowledge of PPE differed by section. There was a wide gap between their knowledge level and practice of using protective devices.[10]

The above studies clearly indicate that although all the workers had knowledge regarding the occupational hazards irrespective of the nature of the occupation they are engaged in, their attitudinal approach toward the betterment of the work environment is positive. But because of lack of provision in the worksite, they are unable to practice. Making workers aware of the occupational hazards and motivating them to use PPE while at work is the need of the hour. Our result therefore calls for urgent strict enforcement of the use of PPE at industries in GIDC area of Dared, Jamnagar. Our study indicates that prior knowledge of safety measures increases use of PPE. Essentially, ignorance and inadequate health and safety information are dual factors that contribute substantially to poor safety practices at industries. Presence of policies and good knowledge of PPE are not enough in prevention of workplace hazards and do not equate to compliance. Training on how to use them is vital. Our result confirms the evidence that training employees in safety measures is vital in increasing their knowledge, competence, and use of safety measures at the workplace. In present study the commonest reasons for not wearing the PPE even when available include perception of low risk to injury, forgetfulness and if the PPE are ill-fitting. Unfortunately, fit test for the PPE were not done in the study environment unlike some other places where it is mandatory. Rates of accidents depend on the type of work that in turn is influenced by differences in skills, knowledge and competence.

Conclusion

The workers using PPE were those who were aware of hazards and PPE. Use of PPE is vital in safeguarding the workers and prevention of work place injuries. The study revealed that nearly half of the workers understand the need for PPE and want to be protected against accident, injury and illness. But still there is a gap between being aware of hazards and use of PPE at work. Supervision, checking and properly maintaining and replacement of PPE would also go a long way in improving the practices of PPE use at work place. Further research is needed to identify the underlying factors leading to low utilisation of PPE despite the workers of GIDC Dared being knowledgeable of it.

References

1. Dharani R, Sivalingam A, Prabhakaran D, Thirumarimurugan M. A Study on prevention of hazard in industry by the use of personal protective equipment and implementing smart technology for personal protective equipment. International Research Journal of Engineering and Technology, 2015, 2(8):1
2. P. O'Leary et al.. Workplace injuries and the take-up of Social Security disability benefits. Social security bulletin, 2012, 72(3):12

3. Shin-ichiSawada, KalevKuklane, Kaoru Wakatsuki, Hideaki Morikawa. New development of research on personal protective equipment (PPE) for occupational safety and health. Industrial Health, 2017; 55:7
4. Jonathan Izudi, Viola Ninsiima, John Bosco Alege. Use of Personal Protective Equipment among Building Construction Workers in Kampala, Uganda. Journal of Environmental and Public Health. 2017:34-38
5. Parimalam Paramasivam, Premalatha Mundankandath Raghavan, Padmini Dasu Srinivasan, Ganguli Anindya Kumar. Knowledge, Attitude and Practice of Dyeing and Printing Workers. Indian Journal of Community Medicine, 2010, 35 (4):11
6. Emmanuel N. Aguwa, Sussan U. Arinze-Onyia, Anne Ndu. Use of Personal Protective Equipment among Health Workers in a Tertiary Health Institution, South East Nigeria: Pre-Ebola Period. International Journal of Health Sciences and Research, 2016, 6(8):16
7. HarshiniRavichandran, Brundha MP. Awareness about Personal Protective Equipments in Hospital Workers (Sweepers and Cleaners)–Research.International Journal of Pharmaceutical Sciences Review and Research, 2016, 40(1):18
8. Yu IT, Lee NL, Wong TW. Knowledge, Attitude and Practice regarding Organic Solvents among Printing Workers in Hong Kong. Journal of Occupational Health, 2005, 47.
9. Haldiya KR, Sachdev R, Mathur ML, Saiyed HN. Knowledge, Attitude and Practices related to Occupational Health Problems among Salt Workers working in the Desert of Rajasthan, India. Journal of Occupational Health, 2005, 47:9

Parimalam P, Kamalamma N, Ganguli AK. Knowledge, Attitude and Practice related to Occupational Health Problems among Garment Workers in Tamil Nadu, India. Journal of Occupational Health, 2007, 49:9There are no sources in the current document.

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