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Original Article

Biological, Physical, Ergonomic, Chemical and Psychological Hazard Awareness Among Health Care and Non-Healthcare Workers

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ABSTRACT

Objective: To assess the level of awareness regarding various hazards among healthcare and non-healthcare workers.
Study Design: Analytical cross-sectional study.
Place and Duration of Study: Conducted in Rawalpindi over a 6-month duration from Nov 2021 to Apr 2022.
Methodology: The estimated sample size was 228. Sampling technique was non-probability convenient sampling. Healthcare group included individuals from medical field. Non healthcare group included persons from other fields. Non willing persons were excluded. A preformed questionnaire with some changes was used. Data was collected through Google forms and analyzed in SPSS version 26.
Results: The sample included 162 males and 66 females. Mean age was 21.10±2.76. Out of the total, 75.9% fell into healthcare group while 24.1% landed into Non healthcare group. In Healthcare group highest awareness was about contact with contaminated specimens among Biological hazards (78.6%), Radiations among Physical hazards (76.9%), standing for prolonged periods among Ergonomic hazards (69.9%), corrosives among Chemical hazards (74.0%), and stress among Psychosocial hazards (86.7%). In Non healthcare group highest percentages were of injuries among Biological hazards (72.7%), poor ventilation among Physical hazards (67.3%), standing for prolonged periods among Ergonomic hazards (70.9%) and stress among Psychosocial hazards (80%).
Conclusions: The study showed that for most of the hazards assessed the Healthcare workers are relatively more aware as compared to the Non healthcare group.

Keywords: Biological, Chemical, Ergonomic, Healthcare, Non-Healthcare, Physical, Psychosocial.

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INTRODUCTION

This research discusses the prevalence of occupational injuries and hazards among healthcare and non-healthcare workers across different contexts in the cities of Rawalpindi and Islamabad. The literature broadly shows that occupational hazards and injuries that compromise the health and safety of healthcare workers are prevalent in the health care and non-healthcare setting and include biological, chemical, physical, mechanical, ergonomic, psychosocial hazards.[1] Studies report that the prevalence of occupational hazards and injuries is highest in developing countries compared to high income countries.[2] Multiple studies and reports have indicated that employees working in healthcare and non-healthcare settings are exposed to a complex variety of health and safety hazards everyday which include: Biological Hazards which may include disease causing micro-organisms such as viruses, bacteria and parasites which lead to disease and interfere with professional work. Lack of germ-free equipment and suitable waste disposal bins expose the staff to fungi like yeast, bacteria, parasites, or blood and spread diseases such as HIV and hepatitis as well as communicable diseases, including tuberculosis and swine bug.

Chemical Hazards which include exposure to hazardous chemicals such as peroxide, lead, tough detergents, flammable solvents, noxious fumes, allergens and active substances which are commonly found in many work environments.[3] Other chemical hazards present in healthcare facilities like, ethylene oxide and hexachlorophene formaldehyde are known human carcinogens which significantly contribute to hazards among professional workers.

Physical Hazards, as slips, trips, falls, physical strains,[4] and violence. The issue of violence against working professionals has been widely reported in several facilities.[5] Again, excessive level of sound,[6] heat and cold temperatures, rapid movement, heavy lifting, electric and magnetic fields are also reported hazards in several facilities.

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Psychosocial Hazards, such as shift work, violence and stress. Job stress which is one of the key causes of psychological hazards is usually associated with working professionals.[7]

Ergonomic Hazards cause injury to the musculoskeletal system as a result of exposure to repetitive movement of body joints, lifting of heavy weights, assumption of awkward postures and stretching of the body beyond comfortable limits to lift objects. According to Liu *et al*.[8] musculoskeletal disorders of hand, wrists and lower back are common disorders reported among professional workers.

As quoted in the nationally conducted study,[9] there may be more than one cause of occupational stress and psychophysical disturbance among workers such as workload, lower salaries, and lack of social and medical facilities; indeed, their general health is poor. Therefore, in Pakistan, it is particularly important to focus on these issues and set rules and regulations to create occupational hazard awareness among workers, which will promote health safety at work places.

METHODOLOGY

Our study design was a descriptive cross-sectional study. This study was carried out in twin cities of Rawalpindi and Islamabad. This study was of 6 months duration taking place from November 2021 to April 2022.

Inclusion Criteria: Healthcare group included individuals from medical field such as students of MBBS, BDS and Allied health sciences as well as professionals like doctors and dentists, nurses while Non healthcare group included students as well as professionals from other fields such as IT, Arts, Business, Engineering.

Exclusion Criteria: Individuals who didn't give consent for participation were excluded from our study.

The sample size taken was of 228 individuals including both males and females. Non probability convenience sampling technique was used for this study. For collection of data a questionnaire was constructed using tool from a previous study.[10] Pilot testing was performed on 25 individuals. Informed consent was taken in the questionnaire. Data collection was carried out online by making a google form and sharing its link on various social media platforms. Data were entered in and analyzed using SPSS version 26. Mean±SD was calculated for continuous variables i.e., Age of participants. Frequencies and percentages of participants aware of each hazard were calculated separately for both groups and compared. Ethical clearance was taken from ethical review committee and informed consent was taken from the participants.

RESULTS

The sample included 162(70.40%) males and 66(29.60%) females. Mean age was 21.10±2.76. Out of the total, 75.9% fell into healthcare group while 24.1% landed into non-healthcare group. The hazards under investigation were separated into 5 different categories namely biological, physical, ergonomic, chemical and psychosocial hazards. Each of these hazards' awareness response has been analyzed and compared separately.

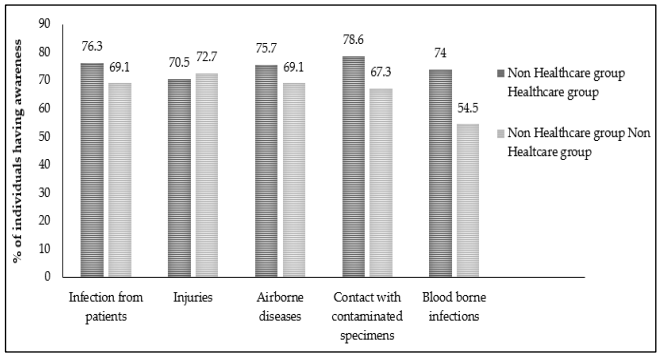

Figure-1: Comparison of Biological hazard awareness between healthcare and non-healthcare workers

Biological hazards received a mean percentage of awareness for healthcare group at 75.02%. For Non-healthcare group, the score received was 66.5% which was less than that of the healthcare group.[5] Individual parameters within biological hazards were all evaluated and scored individually which include infections from patients, injuries, airborne diseases, contact with contaminated specimens and blood borne infections. Our results showed that the healthcare group thought of Contact with contaminated specimens (78.6%) as the most detrimental physical hazard as opposed to the non-healthcare group which considered injuries (72.7%) as such.

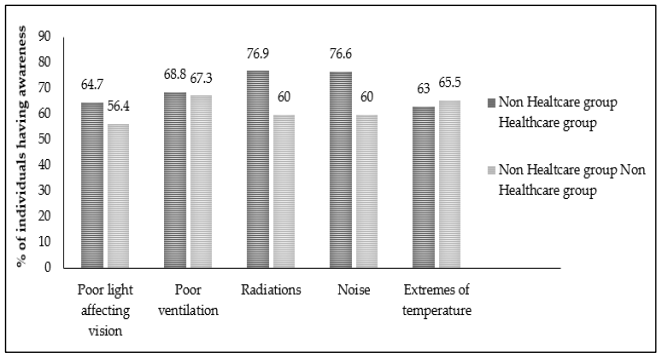

Figure-2: Comparison of Physical hazard awareness between healthcare and non-healthcare workers

Physical hazards, when evaluated and scored, received a mean percentage of awareness for healthcare group at 70%. For Non-healthcare group, the score received was 61.8% which was less than that of the healthcare group.[5] possible physical hazards were evaluated in our questionnaire which are poor light affecting vision, poor ventilation, radiations, noise and extremes of temperature. Our results showed that the healthcare group thought of radiations (76.9%) as the most detrimental physical hazard as opposed to the non-healthcare group which considered poor ventilation (67.3%) as such.

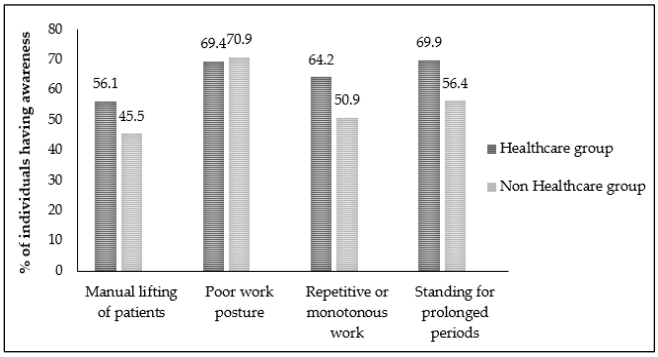

Figure-3: Comparison of Ergonomic hazard awareness betweenhealthcare and non-healthcare workers

Ergonomic hazards, when evaluated and scored, received a mean percentage of awareness for healthcare group at 64.9%. For Non-healthcare group, the score received was 55.9% which was less than that of the healthcare group.[4] possible ergonomic hazards were evaluated in our questionnaire which are manual lifting of patients, poor work posture, repetitive or monotonous work and standing for prolonged periods. Our results showed that the healthcare group thought of standing for prolonged periods (69.9%) as the most detrimental physical hazard as opposed to the non-healthcare group which considered poor work posture (70.9%) as such.

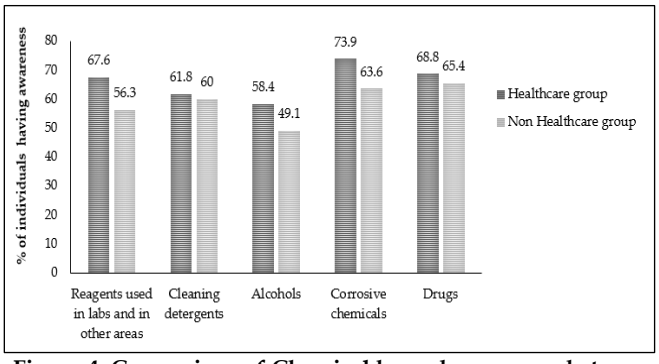

Figure-4: Comparison of Chemical hazard awareness between healthcare and non-healthcare workers

Chemical hazards, when evaluated and scored, received a mean percentage of awareness for healthcare group at 66.1%. For Non-healthcare group, the score received was 58.8% which was less than that of the healthcare group.[5] possible ergonomic hazards were evaluated in our questionnaire which are reagents used in labs and in other areas, cleaning detergents, alcohols, corrosive chemicals and drugs. Our results showed that the healthcare group thought of corrosive chemicals (73.9%) as the most detrimental physical hazard as opposed to the non-healthcare group which considered drugs (65.4%) as such.

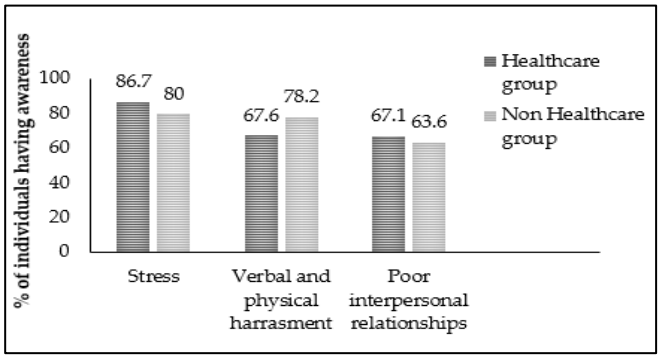

Figure 5: Comparison of Psychosocial hazard awareness between healthcare and non-healthcare workers

Psychosocial hazards, when evaluated and scored, received a mean percentage of awareness for healthcare group at 73.8%. For Non-healthcare group, the score received was 73.9% which was almost equal (in fact slightly higher) than that of the healthcare group.[3] possible psychosocial hazards were evaluated in our questionnaire which are stress, verbal and physical harassment. Our results showed that stress was thought of as the most detrimental psychosocial hazard by both the healthcare group (86.7%) and the non-healthcare group (80.0%).

DISCUSSION

Participants were examined for their level of knowledge of different (5) classes of occupational hazards namely: biological hazards, physical hazards, chemical hazards, psychosocial hazards and ergonomic hazards. Each of these hazards could lead to accidents, injury, disease and sometimes death among healthcare and non-healthcare workers and therefore it is imperative for the respective professionals to have adequate knowledge of them.

Findings of the study showed that the healthcare workers recorded the following mean percentages for biological hazards (75.02%), physical hazards (70%), chemical hazards (66.1%), psychosocial hazards (73.8%)

and ergonomic hazards (64.9%). For the non-healthcare workers, they recorded the following mean percentages for biological hazards (66.5%), physical hazards (61.8%), chemical hazards (58.8%), psychosocial hazards (73.9%) and ergonomic hazards (55.9%).

From the following data, we can interpret that the healthcare workers have better awareness of almost every type of hazard as compared to the non-healthcare workers, with the only exception being the psychosocial hazards and even here, the margin is negligibly small. Thus, healthcare workers have appeared to be clearly superior in our conducted research. But still, the overall awareness levels of our participants in either of the categories cannot be said to be very high, with only biological hazard awareness amongst healthcare workers crossing the 75% mark. The highest scored obtained by healthcare workers was for awareness of biological hazards (75.02%). For non-healthcare workers, it was obtained for awareness of psychosocial hazards (73.9%). Another very notable point to be seen is that the lowest score obtained by both the categories was for the awareness of ergonomic hazards, the score being 64.9% for healthcare workers and 55.9% for non-healthcare workers.

Something to be noted is that when compared to the local research conducted at Nawaz Sharif Social Security Hospital, Lahore Pakistan,[10] the participants of our research had better hazard awareness regarding occupational hazards. But, when compared to the research,[11] aimed specifically at healthcare worker's occupational hazard awareness, the participants in our conducted research fell short of the participants of this research in every involved category. When compared to a study conducted among healthcare workers in Nigeria,[12] the participants in our conducted research performed much better in ergonomic hazard awareness and only marginally better in biological hazard awareness than the participants of that research, but were well outmatched in physical & chemical hazard awareness.

Overall, our research was consistent with the study on hospital safety climate,[13] that healthcare workers record high levels of awareness of biological and psychosocial hazards. Contrary to such studies, however, the participants of this present study recorded low levels of knowledge of chemical, ergonomic and relatively low level of knowledge of physical hazards. Perhaps, further training on these hazards would improve the level of knowledge of these hazards among the staff and measures put in place in the event of an emergency situation resulting from their exposures. Chemical and Physical hazards are known to be among the most common type of hazards that confront workers of developing countries (WHO, 2006). The fact that participants recorded low levels of these indicates that further training should be given to the staff affected in order to prevent or minimize the exposure to accidents and disease occurring from these hazards.

When the Non-healthcare worker participants of our research were compared to a local research,[14] it turned out that they have more occupational hazard awareness then the group they were compared to. But upon comparison with the participants of this research conducted upon Sawmill workers in Nigeria,[15] we found out that our participants fared far better in comparison to theirs. Conversely, when compared to research conducted on cement factory workers in Nigeria,[16] our participants were by far the inferior to theirs. The non-healthcare workers are exposed to many hazards of various types, e.g., workers in sawmill industries environment have high risk exposure to occupational hazards,[17-19] with the same being true for computer operators,[20] so the overall low level of awareness of our participants indicates that the concerned individuals should be given proper training to minimize the risks posed by occupational hazards.

The knowledge to be obtained from research such as this can prove to be monumental in order to reduce undue risks for the working society. According to the International Labor Organization (ILO), 160 million workers suffer from occupational diseases, more than 270 million suffer from occupational injuries and about 2 million workers die prematurely every year from occupational illnesses such as respiratory, musculoskeletal, noise induced hearing loss (NIHL), occupational poisonings, skin, infections, silicosis, cancers and injuries.[21] This amounts to 4% of annual global GDP. More than 80% burden of the worldwide workforce and occupational diseases/injuries occurs in developing countries. This shows tip of the iceberg as under reporting in developing countries is common. Workers and their families suffer from pain and misery, economic and job losses. Employers confront loss of production, reduction in the quality of work and negative image of the organization according to a local study related to occupational health and safety among textile mills workers in Dera Ismail khan'.[22]

The effect of these hazards can be minimized by using the hazards control strategies by all the stake holders including the state, the manager, the employer and the worker. They all have responsibilities to take up

medical, engineering and legislative interventions to make the work environment safer.[23] Besides health, occupational health and safety also ensures increased productivity, higher quality of work, increased work-force morale, reduced employee turnover & overall quality of life. These are just some of the benefits to be gained. Maslow's hierarchy of needs says that an individual at a workplace prioritizes his physiological and safety needs to social esteem and growth needs. Occupational health and safety, therefore can be a strong motivator for a better and healthier society.[24]

LIMITATION OF STUDY

Since the sample size was not very large the results cannot be generalized to entire population.Inclusion of students and not just professionals could have affected our results. The unequal proportions of the two groups could have some possible effect on our results. Participants could have filled the questionnaire frivolously. Unanticipated obstacles.

RECOMMENDATIONS

1. Workers must be equipped with adequate knowledge and skills about occupational health hazards, safety measures and personal protective equipment especially before their first practical experience.
2. Workers should be trained on dealing with intense emotions, violence and body mechanics in their respective professions.
3. Workers should formally report hazards to authority figures.
4. Periodic medical examination policy should be adopted by management.
5. Consider the influences that organizational and individual factors have on hazard management, appropriately allocating labor based on potential influential factors can improve the efficiency and effectiveness of occupational health and safety.
6. Further studies on a large scale are suggested to confirm the study results.

CONCLUSION

In our study, the level of awareness of occupational hazards is clearly higher in the healthcare group as compared to the non-healthcare group, except for Psychosocial hazards for which non healthcare workers have the same level of awareness, in fact slightly higher than that of healthcare group. Speaking of all hazards collectively healthcare group is more aware of the discussed hazards, however the level is not as high as it should be considering the importance of work place safety and there is a significant margin of improvement for both groups.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AH: Supervision, Conception, Study design, analysis and Interperitation of data, Critically reviewed manuscript & approval for the final version to be published.

SFM: Co-supervision, Data entry, analysis and interpretation, manuscript writing & approval for the final version to be published.

AS: Critically reviewed, Drafted manuscript & approval for the final version to be published.

MSN:, MRS: Data colllection, Entry and analysis of data, preparation of rough draft & approval for the final version to be published.

TI:, AA: Data colllection, Critically reviewed, Drafted manuscript & approval for the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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