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Research Article

Knowledge, Attitude, and Practices regarding Occupational Hazards among Medical Laboratory Workers in Pakistan; A Multi-Center Cross-Sectional Study

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ABSTRACT

Background: Laboratories workers in hospitals generally are faced with many hazards at work. This is especially true in developing countries where health service delivery is fraught with minimal protective precautions against exposures to numerous fomites and infectious agents. The present study aimed to assess knowledge, attitude, and practice (KNOWLEDGE, ATTITUDE, AND PRACTICES) level on laboratory safety practices and frequency of occupational hazards and needle-stick injuries among medical laboratory workers visiting different hospitals and laboratories in Lahore.

Methods: A cross-sectional study was conducted using a close-ended questionnaire. To determine the knowledge, attitude, and practices level of occupational hazards among 201 medical laboratory workers visiting the different hospital facilities in Lahore from March 2018 to June 2018. A 95% confidence interval chi-square test was applied to assess the association using SPSS version 25.00.

Results: Out of 201 participants, most of the respondents (72) were Clinical lab technicians, and 70.6% were male. The mean age (+ S.D.) of 36.1 years (± 10.0 years). The study results revealed that most of the respondents (77) were undergraduates (38.3%), had a monthly income of more than 60,000 rupees (67.7%), were married, and 45.3% had biosafety training. The frequency of exposure to needle-stick injury among medical laboratory workers was 46.8%. The knowledge, attitude, and practices score showed that 60.7% had average knowledge while 89.5 % had a positive attitude, and 56.2% had good practices. The association of knowledge score with respondents' age ($X2=11.632$, $p=0.003$), occupation status ($X2=52.253$, $p<0.001$), education ($X2=24.995$, $p<0.001$), and professional education ($X2=8.113$, $p=0.017$) were statistically significant. Similarly, the association of practice scores with males ($p=0.028$), medical laboratory professionals ($p<0.001$), education ($p<0.001$), and professional education ($p<0.001$) were statistically significant.

Conclusion: A gap between knowledge, attitude, and practices having a highly positive attitude with average knowledge but having poor laboratory practices was

recorded here. Poor laboratory safety compliance, lack of personal protective equipment, increased workload, and ergonomics risk were the reasons.

INTRODUCTION

In a Hospital setting, the pathology laboratory is one of the top departments and comprises various departments. Medical workers in laboratories experience a variety of work-related hazards at their workplace [1,2]. Occupational hazard refers to workplace activities that can cause an increase in the risk of causing injury or ill health [3]. Biological and chemical hazards in laboratories can arise from various causes and actions, such as aerosol exposure, spills, and splashes, accidental needle sticks, cuts from sharp materials and broken glass, oral pipetting, and centrifuge mishaps [4]. Increased morbidity and mortality in workers exposed to hazards underlines the importance of occupational health and safety measures.

Estimates show around 100,000 people die yearly due to occupational health hazards, and around 400,000 new cases yearly [5]. According to WHO report, around 3 million healthcare workers get exposed to blood-borne viruses through the cutaneous route. In healthcare workers, globally around 2.5% of HIV and 40% of Hepatitis B and C cases are due to these exposures [6]. The main reasons for occupational health hazards are careless attitude, lack of protective equipment, short and overburdened staff, failure to observe safety guidelines, and inadequate knowledge about the operation of modern healthcare equipment [7] Many studies conducted in countries like Saudi Arabia [8], India [9], Ghana [10], Ethiopia [11], Pakistan [12], and Yemen [13] showed fair to poor knowledge of safety measures and lack of awareness about biosafety in laboratory workers.

Factors like a lack of medical facilities, inadequate laws, and an illiterate workforce contribute to Pakistan's miserable state of occupational health and Safety [12]. Most occupational injuries in Pakistan go unreported, and available data on this aspect is scarce. Evidence shows that medical laboratory workers need more knowledge and awareness about the OHS process [12]. OHS is essential in safely executing daily routine activities in a workplace. Implementing control measures requires more knowledge about in Pakistan [12,13]. This study aims to describe knowledge, attitude, and practices regarding occupational hazards in Medical Laboratory workers. By conducting a knowledge, attitude, and practices study here, the current study's findings will be a baseline document for students, researchers, and policymakers in the future to make legislations to provide a safe and better workplace for workers.

MATERIALS AND METHODS

An analytical cross-sectional study was conducted using a closed-ended questionnaire collecting information regarding the knowledge, attitude, and practice of medical laboratory staff working in various hospitals in Lahore, Pakistan. The present study was conducted in nine government and private hospitals in Lahore, Pakistan. The hospitals were selected based on the heavy workload in their lab. Lahore is the second most populated city after Karachi in the country. Lahore has an 11.12 million population [13]. A pilot study was conducted on 20 laboratory workers. Modifications were made to the questionnaire based on the pilot testing results. The reliability coefficient for the questionnaire was 0.764, which indicated that the questionnaire was reliable, and this reliability coefficient value is suitable for research purposes.

The study participants included; medical laboratory scientists, laboratory technicians, laboratory attendants, phlebotomists, and pathologists. The target population consists of approximately 500 permanent medical laboratory workers working in nine different laboratories of hospitals. Participants with age ≥24 years, able to understand Pakistan's native language Urdu (the National language of Pakistan) or English, showed voluntary willingness and had the experience of more than one year were and working at the selected study sites included in the study. The sample size of the study was calculated by the following formula $n = N = Z\alpha 2\ P\ (1 - P) / d2$ [14]. The standard normal deviation was 95% confidence level, with prevalence at 84.6% [15]. With a margin of error of 5%, that gives a sample size (n = 201). A non-probability convenience sampling technique was used to select the participants.

A pre-coded piloted close-ended interview questionnaire, both in English and the national language, was used for data collection in face to face interviews. Questionnaires were filled out by a trained interviewer having appropriate knowledge about the knowledge, attitude, and practices level. The questionnaire employed for data collection was developed by

reviewing various knowledge, attitude, and practices questions from published articles in hospital settings and medical laboratories [9,11,13]. The questionnaire (available on request) had sections on the sociodemographic characteristics of the respondents, knowledge, attitude, and practice questions regarding occupational hazards and safety practices. Before analysis, positive responses were coded as '1' while negative responses were coded as '0' for knowledge and practice questions. The attitude was measured by 5 point Likert scale: "Strongly disagree," "disagree," "undecided," "agree," and "strongly agree" and scored 5, 4, 3, 2, and 1, respectively.

The scores by an individual respondent in the knowledge scale were described into poor, average, and good categories. The respondent with a <8 was categorized as having poor knowledge, with a score between 8 to 16 categorized as average knowledge, while scores above >16 were categorized as good knowledge [9,11,12]. The scores by the individual respondent in the attitude scale were stratified into positive and negative attitude categories. The respondents with a score <17 were categorized as having Negative Attitudes, and those who scored 17-35 were categorized as having Positive Attitudes. The respondents who scored between 7 to 9 were recognized as having good practice. In contrast, those who scored between 3 and 6 were categorized as having average practice, and those who scored below three were categorized as having poor practices on occupational hazards and safe laboratory practices. The University of Punjab, Lahore Ethical Review Board approved the study. A signed consent form was also obtained from the hospital administration and in-charges of sections. Before the start of data collection, the participants were well-informed about the purpose of the study. They were made to understand that participation was voluntary and was also assured of the confidentiality of their personal information. Data analysis was done by utilizing SPSS version 25.00. Continuous data were presented using measures of central tendencies with their respective measures of dispersion. Categorical variables were summarized into percentages. Results were summarized and presented in frequencies and tables, respectively. Chi-square ($\chi 2$) was used to analyze the association between knowledge, attitude, and practices score and selected sociodemographic characteristics with a 95% confidence interval.

RESULTS

The response rates of the respondents were > 95%. Among the participants, most (72) were Clinical laboratory technicians, while 70.6% were male and 29.4% were female. The arithmetic-mean age of the participants was 36.1 years (± 10.0 years), the youngest being 24 while the oldest was 60 years old, and 79.1% of respondents were less than 45 years of age. Of the respondents, 38.3% (77) had Bachelor's degree qualifications. While 45.3% of participants had biosafety training, 38.8% of these workers had 1 to 5 years of working experience at medical laboratories (Table 1). Out of 201 respondents, 46.8% (94) had a history of needle-stick injury during their laboratory work experience.

Table 1: Characteristics of medical laboratory professionals at different hospitals of Lahore.

Variables	Description	N (%)
Gender	Male	154 (70.9)
	Female	47 (23.3)
Age	<45	159 (79.1)
	≥45	42 (20.9)
Education	Secondary	33 (16.4)
	Diploma 1yr MLT	45 (22.4)
	Graduation	77 (38.3)
	Higher education	46(22.9)
Income (PKR)	< 30,000	46(21.1)
	30,000-40,000	40(18.4)
	>40,000	115(57.2)
Experience (Years)	01-05	78 (38.8)
	06-10	45 (22.4)
	11-15	23 (11.4)
	16-20	12 (6.0)
	≥21	43 (21.3)
Section	Biochemistry	50 (24.9)
	Microbiology	53 (26.4)
	Molecular biology	9 (4.5)
	Hematology	36 (17.9)
	Histopathology	30 (14.9)
	Blood bank	9 (4.5)
	Phlebotomy	8 (4.0)
	Emergency	6 (3.0)
Job category	Clinical lab scientist	62 (30.8)
	Clinical lab technician	72 (35.8)
	Clinical lab attendant	18 (9.0)
	Phlebotomist	7 (3.5)
	Pathologist	42 (20.9)
Training on biosafety	Yes	91 (45.3)
	No	110 (54.7)
Professional Education	Yes	132 (65.7)
	No	69 (34.3)
Marital status	Single	65 (32.3)
	Married	136 (67.7)

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Table 2: Knowledge of respondents on occupational hazards and safety measures.

Description of knowledge on occupational hazards	Yes N (%)	No N (%)
Do you know the level of containment of biosafety your lab have?	86 (42.8)	115 (57.2)
Do you have received safety education and training on all universal precautions?	84 (41.8)	117 (58.2)
Do you know the use of emergency spill kit in case of any spillage?	44(21.8)	157 (78.1)
Are emergency exits in the lab clearly marked or lightened?	83 (41.3)	118 (58.7)
Do you know the location and operation of safety equipment?	82 (40.8)	119 (59.2)
Do you know about the special announcement procedures and codes in case of emergency?	61 (30.3)	140 (69.7)
Do you know about the handling of all types of waste containers properly and collection of waste in suitable containers?	153 (76.1)	48 (23.9)
Do you think lab has enough and suitable space for work?	84 (41.8)	117 (58.2)
Lab equipment is clearly labeled for biological hazards, toxic or risk?	116 (57.7)	85(42.3)
Do you think lab equipment's are properly placed?	107 (53.2)	94 (46.8)
Do you know about the ergonomic hazards?	80 (39.8)	121 (60.2)
Is there any noise hazard at your working place?	88 (43.8)	113 (56.2)
Do you think that all chemicals should be labeled with their name, preparation/opening date, biosafety symbols and expiration date?	180 (89.6)	21 (10.4)
Do you consult (MSDS) for handling of all chemicals or reagents?	74 (36.8)	127 (63.2)
Do you think patient's samples are contaminated or contain pathogenic organisms?	173 (86.1)	28 (13.9)
Do you know that personal protective equipment (PPEs) are necessary for your job?	180 (89.6)	21 (10.4)
Do you experience workload?	178 (88.6)	23(11.4)
Is there lack of staff?	177 (88.1)	24(11.9)
Do you discard the sharp things in sharp box/yellow box?	86 (42.8)	115 (57.2)
Do you recognize toxic/poisonous symbol?	167 (83.1)	34 (16.9)
Do you recognize flammable symbol?	176 (87.6)	25 (12.4)
Do you recognize biohazard symbol?	119 (59.2)	82 (40.8)

Table 2 shows that most of the workers had significantly good knowledge of work in the laboratories (Table 2). A high fraction of respondents (76%) knew the proper handling and segregation of waste material. At the same time, 86.1% of respondents knew SOP regarding patient sample management. In addition, knowledge among respondents regarding personal protection was 89.6%. While 63.2% had poor knowledge of Material Safety Data Sheets (MSDS), 60.2% of ergonomic hazards, and 57.2% had poor knowledge of the discard of sharp things. According to the knowledge score, 6% of the participants needed better knowledge regarding occupational hazards and safety measures. While 60.7% had, average knowledge and 33.3 % had good knowledge of occupational health hazards and laboratory safety measures (Table 2).

Table 3: Association between selected sociodemographic variables and knowledge score of respondents on

Characteristics	N	Knowledge score			X^2	p-value
		Poor Knowledge (Score: ≤ 8)	Average Knowledge (Score: 8-16)	Good Knowledge (Score:16-24)		
Age	<45	5(41.7)	97(79.5)	57(85.1)	11.632	0.05*
	≥45	7(58.3)	25(20.5)	10(14.9)		
Gender	Male	12(100)	84(68.9)	46(68.7)	5.303	0.07**
	Female	0(0.0)	38(31.1)	21(31.3)		
Job category	Clinical lab scientist	0(0)	24(19.7)	38(56.7)	52.253	0.01*
	Clinical lab technician	6(50.0)	48(39.3)	18(26.9)		
	Clinical lab attendant	5(41.7)	12(9.8)	1(1.5)		
	Phlebotomist	0(0)	4(3.3)	3(4.5)		
	Pathologist	1(8.3)	34(27.9)	7(10.4)		
Education	Secondary	6(50.0)	24(19.7)	3(4.5)	24.995	0.01*
	Diploma	4(33.3)	29(23.8)	12(17.9)		
	Graduation	2(16.7)	40(32.8)	35(52.2)		
	Higher education	0(0.0)	29(23.8)	17(25.4)		
Experience		1(8.3)	44(36.1)	33(49.3)	12.513	0.130**
		3(25.0)	29(23.8)	13(19.4)		
		2(16.7)	15(12.3)	6(9.0)		
		0(0.0)	9(7.4)	3(4.5)		
	≥ 21	6(50.0)	25(20.5)	12(17.9)		
Professional Education		8(66.7)	44(36.1)	17(25.4)	8.113	0.017*
		4(33.3)	78(63.9)	50(74.6)		

*p < 0.05: significant ** p > 0.05 non-significant

Several factors were studied here (Table 3) to assess the impact of different sociodemographic variables on the knowledge of medical laboratory workers regarding occupational hazards. A statistically significant (X2=11.632; p

value<0.001) association of knowledge score was recorded with the age of the respondent, job category (X2=52.253, p<0.001), education level (X2=24.995, p<0.001) and professional education (X2=8.113, p=0.017) was also found as statistically associated with the knowledge score related to occupational hazards in medical laboratory workers (Table 3). The results of (Table 4) showed a significantly higher number (98.6%) of the participants who were found well trained against PPEs usage and regarding the working environment safety protocols. Most of them agreed that wearing gloves during phlebotomy reduces the risk of infection, while 96.6% believed in prioritizing health and Safety as a part of conductive work. Concerning the attitude scale, 89.5% of respondents were categorized as having Positive Attitudes, while 10.5% were categorized as having Negative Attitudes toward occupational hazards and laboratory safety practices (Table 4).

Table 4: Attitude of participants on occupational hazards and safety practices.

Attitude on occupational health hazards	Strongly Disagree N (%)	Disagree N (%)	Undecided N (%)	Agree N (%)	Strongly Agree N (%)
Do you think that training of staff and provision of PPEs is necessary to reduce the risk of exposure to occupational hazards?	0 (0.0)	3 (1.5)	0 (0.0)	59(29.4)	139(69.2)
Do you think wearing of gloves at the time of phlebotomy is just wasting time?	02 (50.7)	3 (46.3)	0 (0.0)	4 (2.0)	2(1.0)
Aprons and Face masks/Face shield should be worn in procedures where splash/spill of fluid is likely?	1(0.5	8(4.0)	0(0.0)	70(34.8)	122(60.7)
Used needles should never be recapped?	0(0.0)	4(2.0)	0(0.0)	84(41.8)	113(56.2)
Health and Safety is a high priority when you are performing your job?	1(0.5)	5(2.5)	1(0.5)	60(29.9)	134(66.7)
Do you think prevention of occupational hazard is the joint responsibility of the hospital management and the staff?	0(0.0)	3(1.5)	1(0.5)	65(32.3)	132(65.7)
All exposures to occupational hazards should be reported and documented by appropriate authorities.	1(0.5)	3(1.5)	0(0.0)	63(31.3)	134(66.7)

Table 5: Response of participants on occupational health hazards and biosafety.

Practices on occupational hazards and Safety	Yes N (%)	No N (%)
Are work surfaces and equipment decontaminated before starting work or after any spill or splash?	62 (30.8)	139 (69.2)
Do you use biosafety cabinets? Or properly disinfect it regularly?	111(55.2)	90 (44.7)
Do you handle any patients sample without wearing gloves?	92 (45.8)	109 (54.2)
Do you handle any chemicals without referring to the MSDS?	123(61.2)	78 (38.8)
Does hand washing occur after every removal of gloves or before leaving the laboratory?	188 (93.5)	13 (6.5)
Does food, drink, medicine and cosmetics consumed and stored in the laboratory?	71 (35.3)	130 (64.7)
Do you report any injury or illness to your supervisor or safety officer regardless of any fear or severity?	155 (77.1)	46 (22.9)
Do Health and safety team regularly conduct safety audits in your department?	60 (29.9)	141 (70.1)
Do you always segregate the biomedical waste before disposal?	21 (60.2)	80 (39.8)

The results of (Table 5) showed that almost half of the participants 45.8% handled patients' samples without wearing gloves. At the same time, 61.2% reported that they mostly handle chemicals without referring to the MSDS (Material safety data sheet). While 93.5% of respondents properly wash their hands after the removal of gloves or before leaving the laboratory. Overall 56.2% of the participants had good standards of practice, and 33.8% of the respondents had average or below standards of practice regarding laboratory safety procedures (Table 5). The association of sociodemographic factors with the practice score of medical laboratory workers was also assessed using the Chi-square test at a 95% confidence interval (Table 6). Where gender

(female) was found to have a significantly low practice score compared to male (X2=7.166, P=0.028). Also, job category (X2=51.160, P<0.001), education level (X2=25.164, P<0.001), and professional education (X2=17.659, P<0.001) were recorded as statistically associated with practice scores among medical laboratory workers (Table 6).

Table 6: Association between selected sociodemographic variables and practice score of respondents on occupational hazards (N =201).

Characteristics	No	Practice score			X2	p-value
		Poor Practice Prti (Score < 3)	A Average practice (Score 3-6)	Good practice (Score 7-10)		
Age	<45	15(75.0)	1(75.0)	93(82.3)	1.595	0.450**
	≥45	5(25.0)	7(25.0)	20(17.7)		
Gender	Male	9(45.0)	1(75.0)	82(72.6)	166	0.028*
	Female	11(5.0)	7(25.0)	31(27.4)		
Job category	Clinical lab scientist	1(5.0)	13(19.1)	48(42.5)	51.160	0.01*
	Clinical lab technician	2(10.0)	32(47.1)	38(33.6)		
	Clinical lab attendant	6(30.0)	7(10.3)	5(4.4)		
	Phlebotomist	0(0.0)	0(0.0)	7(6.2)		
	Pathologist	11(55.0)	16(23.5)	15(13.3)		
Education	Secondary	8(40.0)	6(23.5)	9(8.0)	25.164	0.01*
	Diploma	0(0.0)	14(20.6)	31(27.4)		
	Graduation	4(20.0)	24(35.3)	49(43.4)		
	Higher education	8(40.0)	14(20.6)	24(21.2)		
Experience	1-5	8(40.0)	20(29.4)	50(44.2)	6.276	0.616**
	6-10	5(25.0)	17(25.0)	23(20.4)		
	11-15	3(15.0)	9(13.2)	11(9.7)		
	16-20	0(0.0)	4(5.9)	8(7.1)		
	≥ 21	4(20.0)	18(26.5)	21(18.6)		
Professional Education	No	13(65.0)	30(44.1)	26(23.0)	17.659	0.01*
	Yes	7(35.0)	38(55.9)	87(77.0)		

*p < 0.05: significant ** p > 0.05 non-significant

DISCUSSION

The clinical laboratory is a workplace where many occupational hazards, such as chemicals, complex instrumentation, and potential pathogens, are encountered daily [15]. However, the laboratory can be a safe place to work and learn if possible hazards are identified, and safety and infection control protocols are followed [16]. Most of the study participants were male (70.6%), which is why in Pakistani society, males are more responsible for earnings than females. Most of the study participants were young (age <45 years) which resembles the national population average age and also reported in recent studies in Pakistan [15], Nigeria [18], Malaysia [19], Southwest Nigeria [20], and also in North central Nigeria [17]. For education level, most of the participants (38.3%) have a Bachelor's degree [12,15,21]. Concerning job category, the majority of the participants in this study were Medical lab technologists (66.8%), and most of the respondents (38.8%) had 1-5 years of work experience [15], .which is also in line with reports from Southwest Nigeria [20] and Kenya [21].

The participant's knowledge level recorded here showed that 86.1% were aware of the sample handling procedure [22], While 58.2% did not know the standards regarding suitable space required during work to prevent occupational injuries [23]. More than half (58%) of participants had no history of safety education and training on universal precautions [12]. In developed countries, the case is different. The laboratory workers do have proper safety education and training sessions before the start of the job as well as routine training [23]. It was also revealed that 89.6% of participants agreed with PPE being necessary for their jobs [18] 59.2% of the participants could identify various biohazard symbols. But it is still below the standards practiced in developed countries and a recently published study [22]. To identify the toxic symbol, 83.1% of participants were able to manage so. These findings are similar to studies conducted in neighboring countries [24]. The average knowledge score of the participants was found unsatisfactory at 60.7% regarding occupational health hazards and safety measures [25,26]. It could be attributed to the difference in educational institutes' standards, limited training opportunities in developing counties like Pakistan, and workload due to a higher average patient number per laboratory worker.

The results of the present study showed that most participants (85.4 %) had a positive attitude toward safety measures and the prevention of occupational health hazards [18]. While 99%of the participants considered the capacity building on the training of staff, provision of PPE, and documentation of occupational hazards to reduce the risk and effect of exposures. In addition, we recorded that most participants (96%) were aware of the recapping of used needles comparatively, as discussed in another study [18]. 96% of the participants prioritized safety and health while working in laboratories [18,27]. The finding is due to the higher fraction of participants having greater knowledge scores and fear of

occupational infections. Again, many HCWs attend in-service training workshops that have sessions on safety precautions in HCFs. They believed that this should be a shared responsibility between hospital management (with the infection control committee playing a major role) and the staff, who bear the consequences of occupational injuries with their dependents.

The summarization of practice score identified that more than half (56.2%) of respondents had a sense of good practices related to occupational hazards and laboratory safety practices. While 33.8% of laboratory professionals used to have average laboratory safety practices. The present study also revealed that more than half (30.8%) of participants needed to decontaminate work surfaces and equipment before starting [23]. Compared to previous study findings, more than half of the laboratory staff properly disinfect and decontaminate the biosafety cabinets regularly [23]. 93.5% of the participants reported properly washing their hands after removing gloves or leaving the laboratory [20, 23]. In addition, this study revealed that more than half (60.2 %) of participants have good practice in the segregation and proper disposal of biomedical waste in their designated dustbins [18].

Also, 77.1% of participants reported all needle-stick injuries regardless of severity; previous study findings were slightly higher [18,29]. At the same time, 22.9 % of laboratory workers did not report any workplace injury like percutaneous injuries, latex allergies, and physical injuries that were unreported and without proper documentation, as in agreement with prior studies [16,23]. In contrast, the results of the previous study showed that only 30% of cases were filled accordingly in the logbook for incident reporting [23]. 45.8% of participants admitted that they handled a sample of patients without wearing gloves compared to other studies [20,22,23]. The study's contradictory findings may result from a need for more availability of personal protective equipment. The training sessions on handling needles and sharps typically go quickly, from safety measures during usage to needle disposal. It should be emphasized in safety training programs that extreme care and attention must be maintained even when handling items in between.

More than half (61.2%) of participants need to consult MSDS, which showed poor practices regarding chemical hazards compared to developed countries [22-24,28]. This might be because of a lack of training sessions each year in these hospitals and laboratories, a lack of a standard education system, and the extra burden of samples and patients [23]. Therefore, attention needs to pay to causal factors and the circumstances under which these occur to explore the possibilities for the prevention of such incidents through improvements in knowledge, attitude, and practices.

The limitations of the present study include the generalizability of the results to the general population because of the small sample size and non-probability sampling technique. The study describes various determinants related to occupational injuries among medical laboratory workers. This is primarily the first study that focuses on the frequency of occupational hazards, especially non-biological ones that most laboratory workers face in Pakistan. The strength of the present study is the single observer that excludes observer bias. In the United States, the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA) issued "Universal Precaution Guidelines" in 1985 to promote awareness among healthcare workers about the risks of sharp injuries and other types of disease transmission. Since then, these principles have become the global standard in hospital and community care settings. There needs to be more practices and implementation of good biosafety measures in clinical labs among laboratory workers. A strict regulation of biosafety practices is required to ensure the complete security of laboratory employees against lab infections and incidents. There should be a registration system for laboratories at the national level. Before issuing a license to any laboratory, experts should perform a proper evaluation to examine laboratory design, proper ventilation, and entrance and exit to ensure laboratory biosafety. There is a need for another study on the point and process of exposure to hazards on job performance, the burden of participants, and the consequences of the hazards.

FUNDING

This study received no funding

CONFLICT OF INTERESTS

No conflict of interest is reported.

ETHICS

The University of the Punjab, Lahore Ethical Review Board approved the study.

INFORMED CONSENT

Informed consent was obtained from all the participants.

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