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Knowledge, Attitude and Practice (KAP) of Laboratory Safety among Laboratory Workers

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ABSTRACT

Clinical laboratories have an essential part in the diagnosis of disease. However, they also pose several hazards, including exposure to infectious agents, chemicals and radiation, as well as physical hazards such as ergonomic injuries. Adequate safety measures must be designed and practiced to minimize the risk of hazards and make sure the safety of laboratory workers. **Objectives:** To assess Knowledge, Attitude and Practice of Laboratory Safety among laboratory workers. **Methods:** It was an observational cross-sectional study conducted over two months in all the affiliated laboratories of Mayo Hospital, Lahore. The questionnaire regarding Knowledge, Attitude and Practice regarding Laboratory Safety was filled by 75 participants. All the collected data were analyzed using SPSS 23. The qualitative variables were mentioned as frequency and percentage and the quantitative variables as mean ± SD. **Results:** Out of 75 participants, 59% were male and 41% were female. The Knowledge, Attitude and Practice scores were 23.15 2.88, 11.0 1.26 and 11.73 1.97 respectively. The job title was associated with knowledge significantly (p= 0.03) and practice level (p=0.01). The participants' knowledge was significantly correlated with attitude (r=0.341, p=0.003) and practice (r=0.379, p=0.001). **Conclusions:** It was concluded that the laboratory workers had overall excellent knowledge, good attitude and practice level. The job title had a significant association with knowledge and practice level. The correlation of knowledge with attitude and practice was significant

INTRODUCTION

The clinical laboratory is an integral part of every hospital and plays a vital role in making a diagnosis. Due to various potential hazards, laboratory workers encounter a large number of health hazards during their routine work [1-3]. Laboratory personnel should be aware of these potential hazards to prevent them by adopting safety measures [4]. Unsafe behaviour accounts for 80-90% of occupational incidents [5, 6]. Laboratory safety is an approach to prevent injuries in the laboratory [7, 8]. Safety begins with identifying potential hazards and adopting a safety-oriented personal behaviour, attitude and good housekeeping and practicing good laboratory techniques consistently [9-11]. Occupational Safety and Health Act (OSHA) ensures the health of employees and provides safety standards as well as guidance for the effective control of laboratory hazards [12, 13]. Both employers and employees must show optimal compliance with OSHA initiatives by collaborating and getting actively involved in the implementation of OSHA programs to avoid hazards [14]. Generally, there are seven types of laboratory hazards:

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1) Chemical hazards 2) Biological hazards 3) Fire hazards 4) Electrical hazards 5) Mechanical hazards 6) Radiation hazards 7) Ergonomic hazards. The most commonly encountered hazard to laboratory personnel is biological hazard which can be transmitted via direct contact with blood and body fluids, needle stick injuries and inhalation of airborne droplets [13-15]. Chemical hazards in the laboratory are mainly due to chemicals such as acids, alkalis, carcinogens, corrosives and irritants [10, 11]. In addition to this, flammable liquids can also cause fire hazards. Another cause of fire hazard is the short-circuiting of electrical equipment. Electrical hazards can also result from naked electricity wires, overloaded circuits and touching the electrical equipment with wet hands [16, 17]. The mechanical hazards in the laboratory are associated with equipment such as centrifuges, homogenizers and autoclaves and improper use or disposal of glassware [11,18]. The radiation hazards are due to radioactive material and non-ionizing radiations from microwaves, heating lamps and safety cabinets used. In addition to these hazards, the ergonomic hazards are due to repetitive manual tasks, continuous microscopy and manual pipetting resulting in ganglion cysts, bursitis, tenosynovitis and musculoskeletal disorders [9, 14]. Laboratory hazards have drastic effects on laboratory personnel and the environment. Most of the time hazards remain unrecognized due to inadequate awareness of safety measures, apathetic attitude and improper practice of safety protocols.

This study aims to assess the knowledge, attitude and practices of laboratory personnel of Mayo Hospital/ King Edward Medical University Lahore towards laboratory safety.

METHODS

This observational cross-sectional study was conducted from November 2022 to December 2022 at all affiliated laboratories of King Edward Medical University/Mayo Hospital, Lahore after approval from IRB (Letter No. 918/RC/KEMU) of King Edward Medical University (KEMU). The sample size was calculated by taking the confidence level of 95%, absolute precision as 5% and the expected percentage of good knowledge of laboratory safety as 96.5% among laboratory workers [12]. Non-probability, convenient sampling technique was used. The data were collected after getting consent from 75 laboratory workers both male and female using a questionnaire designed by keeping in view the formats designs [12, 17]. All technicians and doctors working at the affiliate laboratories and who gave consent to participate were included. While, workers from other laboratories were excluded. The questionnaire was validated by two medical educationists. It was comprised of four sections. Demographic data on age, gender and job title was included in the first section. The second section consisted of questions related to knowledge (n=28), the third section focused on questions related to attitude (n=12) and the last section included questions related to participant's practice regarding Laboratory Safety (n=15). The scoring of knowledge, attitude and practice was based on Bloom's cutoff. The knowledge score was divided into three levels based on correct answers out of 28 questions; Excellent Knowledge [19-21], Good Knowledge [14], and Bad Knowledge (0-13). The score for attitude was characterized by two levels based on correct answers out of 12 questions; Good Attitude (8-12) and Bad Attitude (0-7). Practice score was also labelled by two levels based on correct answers out of 15 questions; Good Practice (10-15) and Bad Practice (0-9). Statistical Package for Social Science (SPSS), version 23 was used to analyze the collected data. The quantitative data were presented as mean ± SD, while the qualitative data was presented as frequency and percentage. The chi-square test was used to determine the association of job title with knowledge, attitude and practice level. Pearson's correlation (r) was applied to measure the correlation of knowledge with practice and attitude score. Results were considered statistically significant with p-value<0.05.

RESULTS

The age of participants showed a mean ± SD 31 ± 8.5 years. There were 44 (59%) male and 31 (41%) female. Out of 75 participants, there were 30 (40%) laboratory technicians, 17 (23%) doctors and 28 (37 %) other laboratory workers including laboratory supervisors, and undergraduate and internship students. The mean ± SD score for knowledge, attitude and practice is given in Table 1

Table 1: Mean ± SD Scores for Knowledge, Attitude and Practice

Variables	n (%)
Age	
Mean ± SD	31 ± 8.5
Gender	
Male	44 (59%)
Female	31 (41%)
Profession	
Laboratory Technicians	30 (40%)
Doctors	17 (23%)
Other Laboratory Workers	28 (37 %)

The mean ± SD score for knowledge, attitude and practice is given in Table 2.

Table 2: Mean ± SD Scores for Knowledge, Attitude and Practice

Variables	Mean ± SD
Knowledge	23.15 ± 2.88
Attitude	11.0 ± 1.26
Practice	11.73 ± 1.97

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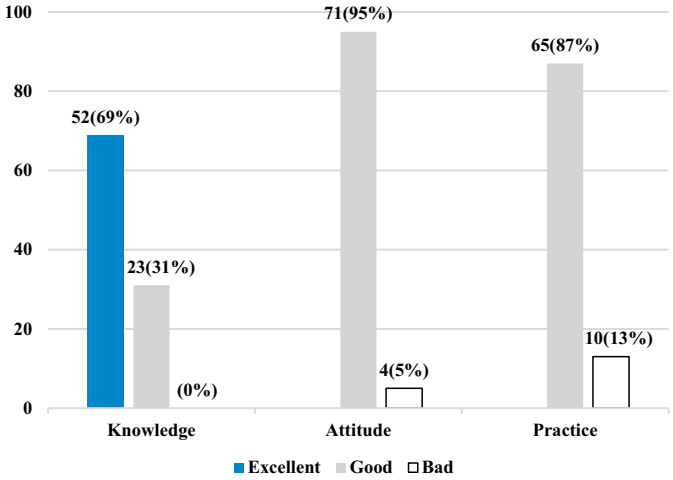

Figure 1: Frequency Distribution of Participants Based On Knowledge, Attitude and Practice Score

The association of job title with Knowledge, Attitude and practice level was determined by using the Chi-square test. p-value<0.05 was considered significant. Job title was found to be significantly associated with knowledge level (p=0.03) and practice level (p=0.01) while no significant association was found between job title and attitude level (p=0.37)as shown in Table 3.

Table 3: Association of Job Title with Knowledge, Attitude and Practice Levels

Variables	Job Title			p-value
	Technicians	Doctors	Others	
Knowledge Level				
Excellent	20	16	16	0.03
Good	10	1	12	
Bad	0	0	0	
Attitude Level				
Good	28	17	25	0.03
Bad	2	0	3	
Practice level				
Good	29	16	20	0.01
Bad	1	1	8	

Knowledge score correlation with Attitude and Practice score was established by applying Pearson's correlation(r). p-value<0.05 was considered statistically significant. Knowledge score was found to be significantly correlated with Attitude score (r=0.341, p=0.003, CI=95%) and Practice score (r=0.379, p=0.001, CI=95%) as shown in Table 4.

Table 4: Knowledge Score Correlation with Attitude Score and Practice Score

Variables	p-value	
	r value	p-value
Attitude Score	0.341	0.003
Practice Score	0.379	0.001

DISCUSSION

Clinical laboratories have potential risk hazards that can lead to life-threatening injuries. The risk of these injuries can be minimized by proper hazard identification and adopting appropriate safety measures. The rational model of health promotion by WHO (2012) assumed that increased knowledge would ultimately be transmitted into a positive, good attitude as well as improved behaviour [7]. So, the study was conducted to assess the Knowledge, Attitude and Practice among laboratory workers regarding laboratory safety measures. The overall mean ± SD knowledge score was 23.15 ± 2.88 with 69% excellent and 31% good knowledge level. These results are comparable with the study of Paul *et al.*, [19]. These results are not in agreement with those of Izegbu *et al.*, which showed a low level of awareness among laboratory workers [20]. The reason behind this low knowledge level may be that the majority of the workers had never attended any informative program on safety measures. The overall mean ± SD attitude score was 11.0 ± 1.26 with 95% of participants having good and 5% having bad attitude levels. The results are in agreement with the study of Goswami *et al.*, [12]. However, the study results of Zaveri *et al.*, and Al-Zyoud *et al.*, stated that most of the respondents had poor attitudes regarding the laboratory [6, 17]. The overall mean practice score was 11.73 ± 1.97 with 65 (87%) of the respondents having good and 10 (13%) having bad practice levels regarding waste management, following spillage protocols, reporting needle stick injuries and use of emergency safety equipment. Likewise, Aluko *et al.*, and Goswami *et al.*, showed good practice levels among healthcare workers [7, 12]. However, our results are contrary to the study by Ahmad *et al.*, [21]. Our study demonstrated a statistically significant association of job title with knowledge (p=0.03) and practice level (p=0.01). While no significant association of job title was shown with attitude level (p=0.37). These results are comparable with the study of Aluko *et al.*, as well as with Ramli *et al.*, [7, 22]. Ndu *et al.*, stated that doctors had a high knowledge of standard precautions as compared to other laboratory staff [23].The Knowledge score was found to be significantly correlated with the Attitude score (r=0.341, p =0.003)as well as with the practice score (r=0.379, p=0.001) and this shows agreement with the results of Mahmoud *et al.*, [11]. According to a study by Rahmat *et al.*, safety perception has a significant impact on safety behaviour. The knowledge positively affects attitude and practice [1]. Compliance with safety standards, use of PPE and proper vaccination of laboratory workers can reduce the risk of occupational hazards. Training programs for laboratory personnel regarding safety procedures can improve their knowledge and therefore attitude and practice in clinical laboratories[9].

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CONCLUSIONS

It was concluded that based on the findings of our study, the laboratory workers had overall excellent knowledge, good attitude and practice levels. The job title showed significant association with knowledge and practice level and knowledge showed significant correlation with attitude and practice. Therefore, our study emphasizes the fact that laboratory workers must be provided with safety equipment and training programs to improve knowledge, attitude and practice to minimize the hazard probability. The study was conducted on a small scale so its results cannot be generalized over other setups.

Authors Contribution

Conceptualization: RD
Methodology: SI, RD, MA[2], SA
Formal analysis: RD, MS
Writing review and editing: RA, Ma[1]

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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