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# Occupational Hazards and Safety Measures Among Medical Laboratories Staff in Eastern Province- KSA

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**Abstract**

**Background:** With the increase in interest and awareness about occupational health and safety. However, in Saudi Arabia, few studies have been conducted about the condition of workers in medical laboratories. **Objectives:** This study attempted to determine the main occupational hazards among medical laboratory staff in Eastern Province- KSA. To assess and evaluate the safety measures undertaken by the medical laboratory staff in Eastern Province- KSA, as well as to identify the factors which hinder the implementation of good occupational safety and health (OSH) practice among medical laboratory staff in Eastern Province- KSA. **Method:** This was a cross-sectional study research design that entailed the use of a modified structured questionnaire. The study was conducted in 10 medical laboratories out of 105 samples from the respondents. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 28, basic descriptive statistical analysis used to perform the following: frequency account, and count percentages. Bar charts and pie charts were used for the presentation of descriptive statistics. **Result:** The most common types of occupational hazards in medical laboratories are biological hazards are bacteria (39.45%). Meanwhile, the most common chemical hazards include flammable liquids and solids (33%). Whereas, the most common physical hazards the most common were related to electricity (26.32 %). The most contributive control measure to mitigate occupational hazards is providing PPE (94.3%). The most common factors that stymie good practice in medical laboratories included poor laboratory design (61% and lack of awareness about laboratory safety procedures (58.1%). **Conclusion:** Increasing awareness about safety

procedures within medical laboratories and improving the infrastructure and design of laboratories will greatly contribute to the prevention of risks to which medical laboratory staff is exposed.

**Keywords:** Occupational safety, safety measures, medical laboratories, laboratories technicians.

## 1. Introduction

The health of healthcare workers is critical to the effective operation of any medical organization. Laboratory staff plays a crucial role in examining patients' bodily fluids to detect harmful microorganisms or abnormalities (Rajan, 2014). However, these workers face numerous occupational hazards that can harm their health if proper precautions are not taken (Alshalani & Salama, 2019). These hazards can be defined as anything with the potential to cause harm to the laboratory staff when they are exposed. The well-being of laboratory staff is essential to the efficient functioning of healthcare organizations (Mbabazi, 2008). Biological hazards refer to living organisms such as bacteria, viruses, fungi, and fragments that can enter the body and cause infections (WHO, 2001). Medical laboratories pose a range of risks to laboratory staff who work with various biological agents, increasing their risk of infection. A cross sectional study conducted in health facilities with medical laboratories in Kenya indicate that the biological risk of exposure to bacteria was 80%, and exposure to parasites 47%, and 8% reported exposure to viral vectors, while 17% exposure to fungi, on average of 65.5% of those medical laboratories technicians were exposed to no less than one type of biological hazards(Tait et al., 2018). Needles and sharps such as scalpels and broken glass are considered a serious risk in medical laboratories environment. These contaminated needles and sharps injected health workers with blood contain pathogenic agents including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). all these constitute a potentially lethal risk to the health of workers. According to a study of healthcare workers conducted in British Columbia showed that laboratory assistants are the top highest exposure rates from infected needles and splashes (Alkther, 2011), indicating that all medical laboratories staff must be well trained and prepared to dealing with all aspects of laboratory hazards.

Chemical hazards can take the form of gases, solids, liquids, mists, fumes, clouds of dust, and vapors, which can be toxic if inhaled, absorbed through the skin, or ingested (Alshalani & Salama, 2019). These hazardous substances pose a threat to the health and safety of laboratory staff (WHO, 2001). Medical laboratories should be outfitted properly for the handling of harmful chemical substances, for example medical laboratories should contain chemical fume hoods for handling hazardous chemical, besides the employees should be well trained and equipped with appropriate personal protective equipment (PPE) (Alqam, 2013). (Alqam, 2013). There are chemicals considered as safety concerns in medical laboratory such as: formaldehydes, formalin and xylene exposures, these chemicals are carcinogens according to IARC (Kim et al., 2018). Proper equipment and precautions should be in place in medical laboratories to handle harmful chemicals. This includes the use of chemical fume hoods and the provision of personal protective equipment (PPE) for employees (Alqam, 2013).

Physical hazards can be mechanical in nature or having a contact with objects which have the potential to cause damage to health (Alqam, 2013). These include extremes temperature, ionizing and non-ionizing radiation, constant loud level of noise, illumination, vibration and electric shocks (WHO, 2001). Musculoskeletal injuries with 10.5% considered as the most common types of physical injuries among medical laboratories technicians, the lower back

pain come in the second, it is found that the most affected organs of body are lower back, leg and hand muscles and the main cause of these injuries are improper lifting of equipment (Chhabra, 2016). Over time, the repetitive motions performed by medical laboratory staff, such as pipetting, using microscopes, operating microtome devices, and typing, can lead to injury due to repetitive stress on muscles, tendons, and joints. This type of injury is referred to as an ergonomic hazard.(Alqam, 2013).

Safety measures plays a significant role and constitute a major concerns within any clinical laboratories due to the high exposer in dealing with hazardous and infectious materials, the risk that medical laboratories staff are exposed to can be either eliminated or reduced by educating, promoting and spreading the excellent health laboratories practices among the employees and providing them with appropriate safety equipment, pointing that safety is the responsibilities of both employees and employer (Alshalani & Salama, 2019). Scarcity of awareness regarding the good safety practices can lead to poor handling and dangerous laboratory practices when collecting, processing of samples and discarding of them, in addition to maintaining a good hand hygienic conditions contribute to prevent the risk at work (Nasim et al., 2010). Medical laboratories technicians behavioral and perspectives toward safety educational programs and laboratory safety is importance for controlling and prevention the hazard, the lack of knowledge or neglecting this led to laboratory accident where they put themselves and others at a serious risk. Poor techniques, carelessness and negligence when dealing with contaminated tools and equipment, exposure to aerosols infection and needle sting are the main causes for laboratory acquired occupational infection (Tait, 2019). Laboratory accidents are growing rapidly because the lack of knowledge on appropriate laboratory measures and techniques among laboratory technicians, failure to applied and follow a safe laboratory procedures and careless behavior among workers (Casanova et al., 2008).

In this research, we aim to determine the main occupational hazards among medical laboratory staff in Eastern Province- KSA. To assess and evaluate the safety measures undertaken by the medical laboratory staff in Eastern Province- KSA, as well as to identify the factors which hinder the implementation of good occupational safety and health (OSH) practice among medical laboratory staff in Eastern.

## 2. Method

A cross-sectional research technique was used from October 2021 to May 2022 to assess the occupational hazards and safety measures among medical laboratory staff in the Eastern Province of Saudi Arabia. A modified questionnaire was distributed among medical laboratory staff to collect personal data and measure the following: occupational hazards that medical staff are exposed to, control measures applied to mitigate OSH hazards, and factors that hinder the implementation of good practices in OSH. The questionnaire was distributed electronically to collect the data. Participants must be medical laboratory staff from both genders who have a full-time job in the Eastern Province of Saudi Arabia, as an inclusion criteria. However, we exclude any intern workers and those who are less than 20 years of age. The target population was the workers who work within a medical laboratory in both governmental and private sectors in the Eastern Province of Saudi Arabia. The data of each worker was collected and registered electronically via QuestionsPro. The sample size was calculated using the formula to determine the sample size, setting the margin of error ε at 5% confidence level. Assuming a population proportion of 0.5 and an unlimited population size, the sample size was calculated to be 148. However, a simple random sampling technique was used, and 105 respondents completed the survey, resulting in a completion rate of 70.94%.

All the entry and analysis of data were carried out using SPSS version 28 and Excel. Basic descriptive statistical analysis was used to perform the following: frequency account and count percentages. Bar charts and pie charts were used for the presentation of descriptive statistics.

## 3. Results

### *3.1 Demographic Characteristic*

The demographic characteristics were described by frequency and percentage. The majority of the respondents were females (57.10%). The nationality of the respondents was predominantly Saudi (87.60%). Most of the study participants fell into the age group of 20-29 years (45.70%), followed by the age group of 30-39 years (36.20%), the age group of 40-49 years (14.30%), and lastly the age group of 50 years and above (3.80%). Nearly half of the participants had a diploma level of education (43.80%), while those with a bachelor's degree were slightly less than those with a diploma, accounting for 40.00% of the participants. The percentage of participants with a master's degree was 14.30%, and only two participants had a PhD level of education (1.90%). In terms of years of experience, the majority of workers had an experience ranging from 1 to 5 years (30.50%). Those with less than one year of experience and those with more than ten years of experience shared the same percentage (23.80%), while those with an experience of 6 to 9 years accounted for 21.90%. The highest number of working hours among the participants was 6 to 9 working hours (78.10%), followed by working hours from 1 to 5 hours with a percentage of 18.10%. The least common working hours were more than 10 hours, accounting for 3.80% of the participants (e.g., Table 1).

Table 1. Descriptive Analysis of the Demographic Characteristics for Medical Laboratories Technicians

| Demographic Variable: | Frequency | Percentage % |
|---|---|---|
| Gender of person being interviewed: | | |
| 1. Male | 45 | 42.90% |
| 2. Female | 60 | 57.10% |
| Nationality: | | |
| 1. Saudi | 92 | 87.60% |
| 2. Non-Saudi | 13 | 12.40% |
| Age group: | | |
| 1. 20-29 Years | 48 | 45.70% |
| 2. 30-39 Years | 38 | 36.20% |
| 3. 40-49 Years | 15 | 14.30% |
| 4. 50 Years and above | 4 | 3.80% |
| Educational level: | | |
| 1. Diploma | 46 | 43.80% |
| 2. Bachelor | 42 | 40.00% |
| 3. Master | 15 | 14.30% |
| 4. PhD | 2 | 1.90% |

| | | |
|---|---|---|
| Working experience: | | |
| 1. Below 1 year | 25 | 23.80% |
| 2. 1-5 Years | 32 | 30.50% |
| 3. 6-9 Years | 23 | 21.90% |
| 4. 10 Years and above | 25 | 23.80% |
| Working hours: | | |
| 1. 1-5 Hours | 19 | 18.10% |
| 2. 6-9 Hours | 82 | 78.10% |
| 3. 10 Hours and above | 4 | 3.80% |

### *3.2 Biological Hazards*

Areas within the laboratory environment, such as areas for specimen processing, slide preparation, and phlebotomy, are rich with microorganisms. Workers can be exposed to these microorganisms, so this study aimed to identify the percentages of exposure to biological hazards in these areas. As shown in **Figure 1**, 39.45% of the participants reported exposure to bacteria, 24.31% reported exposure to parasites, 22.02% reported exposure to viruses, and 14.22% reported exposure to fungi.

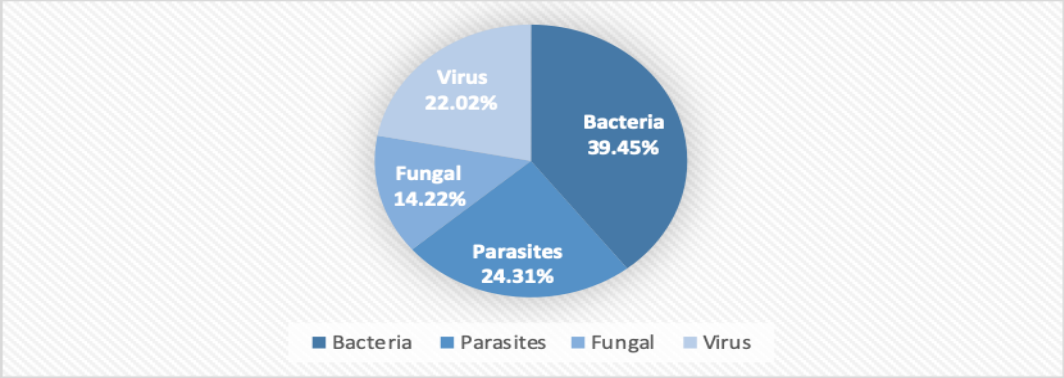


Figure 1. Types of biological Hazards Exposure by Medical Labratory Tecchnicians

### *3.3 Physical Hazards*

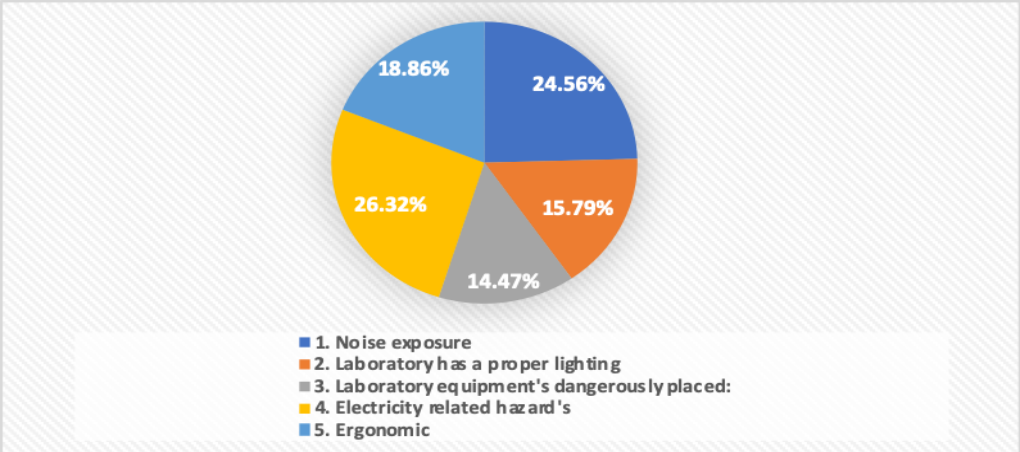


Figure 2. Physical Hazards Exposure by Medical Laboratories Technicians

As shown in Figure 2, the participants reported their exposure to electricity-related hazards as the most common type of physical hazard, with a percentage of 26.32%. Physical hazards in this context refer to instances where they were exposed to electric wires or came into contact with overloaded voltage. Additionally, participants indicated their exposure to noise (24.56%), which was generated by centrifuges and other machines. Ergonomic hazards were also reported (18.86%), resulting from repetitive motions or injuries. Improper lighting was reported by 15.79% of the participants. Lastly, 14.47% of the participants mentioned that laboratory equipment was dangerously placed, posing a risk of falling and causing injuries.

### *3.4 Chemical Hazards*

The study indicates that medical laboratory workers were exposed to flammable and combustible liquids and solids (33.00%) stored in a flammable vented cabinet. Additionally, (26.11%) of the medical laboratory staff were exposed to corrosives produced from acids and bases, while handling unmarked and unlabeled chemicals (25.62%). Exposure to explosives, such as picric acid, appeared to be (15.27%).

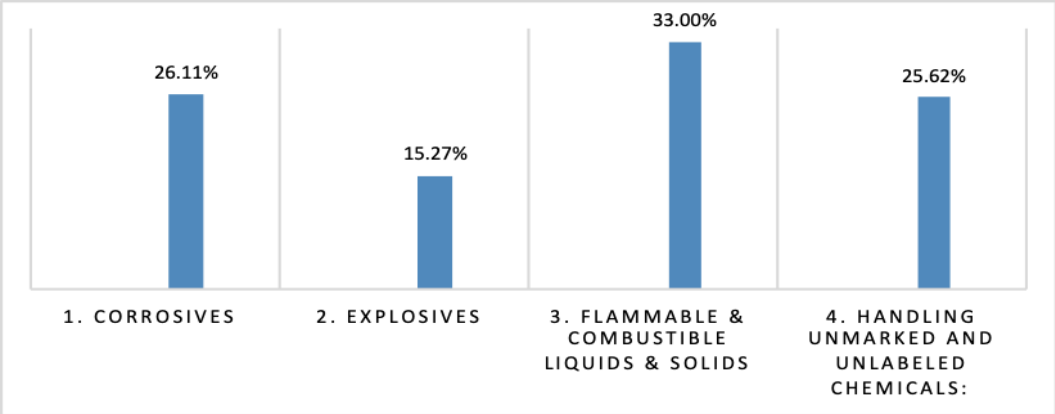


Figure 3. Chemical Hazards Exposure by Medical Laboratories Technicians

### *3.5 Control Measures*

The study aims to assess the safety and control measures taken by medical laboratory staff to mitigate workplace hazards they may encounter. As shown in **Table 2** below, the study indicates that (94.3%) of the medical laboratories provided Personal Protective Equipment (PPE), with only 6 out of 105 respondents reporting a lack of PPE. Participants reported that (92.4%) of their laboratories had first-aid available in case of accidents. The study also shows that (84.8%) of the medical laboratories had biological safety cabinets, AMP, and chemical hoods, which contribute to limiting occupational hazards, especially when dealing with microorganism specimens or human tissue samples. However, a small percentage of respondents reported a lack of these preventive devices, accounting for (15.2%) of the total. The majority of participants (83.8%) reported having a chemical hygiene plan (CHP), which is a written criteria that provides protection against adverse effects associated with hazardous chemical materials. According to 87 participants, their medical laboratories had proper segregation and waste disposal equipment, with a percentage of 82.9%. Additionally, 81% of the medical laboratories were fully equipped with antiseptics. Among the medical laboratory staff, 63.8% had received HIV screening before, and 46.7% of them were provided with post-exposure prophylaxis (PEP), which is a short-term treatment for HIV virus exposure. However, there was a percentage of 23.8% of those who had received HIV screening but were not provided with PEP.

Table 2. Control measures applied by medical laboratories staff to mitigate OSH hazards.

| Control measures taken to prevent occupational hazards: | Frequency | Percentage % |
|---|---|---|
| Medical laboratory has a first-aid in case of accidents: | | |
| 1. Yes | 97 | 92.4% |
| 2. No | 8 | 7.6% |
| Medical laboratory technician provided with Personal Protective Equipment (PPE): | | |
| 1. Yes | 99 | 94.3% |
| 2. No | 6 | 5.7% |
| Medical laboratory has a chemical hygiene plan: | | |
| 1. Yes | 88 | 83.8% |
| 2. No | 17 | 16.2% |
| Medical laboratory has a biological safety cabinet, AMP and chemical hood: | | |
| 1. Yes | 89 | 84.8% |
| 2. No | 16 | 15.2% |
| Medical laboratory has a proper segregation, and waste disposal equipment: | | |
| 1. Yes | 87 | 82.9% |
| 2. No | 18 | 17.1% |
| Medical laboratory provided with antiseptics: | | |
| 1. Yes | 85 | 81% |
| 2. No | 20 | 19% |
| Medical laboratory technician had received HIV screening: | | |
| 1. Yes | 67 | 63.8% |
| 2. No | 38 | 36.2% |
| In case of exposure to HIV, medical laboratory technician provided with post exposure prophylaxis | | |
| 1. Yes | 49 | 46.7% |
| 2. No | 25 | 23.8% |
| 3. Not applicable | 31 | 29.5% |

At the individual level, protective measures were observed, as described in Table 3 below. According to 68 participants, they reported dealing with COVID-19 samples during the pandemic, accounting for a percentage of (64.8%). As a result, (47.6%) of those who had to handle COVID-19 samples reported contracting the virus and becoming infected, while (17.1%) reported not becoming infected despite dealing with the virus samples. The study indicates that (61.9%) of the participants were immunized against Hepatitis A, (71.4%) were immunized against Hepatitis B, (35.2%) reported being immunized against Tuberculosis, and

(63.8%) reported being immunized against COVID-19.

Table 3. Individual control measures applied by medical laboratories staff to mitigate OSH hazards

| Individual protective measures: | Frequency | Percentage % |
|---|---|---|
| Medical laboratory technician was a part of their job to deal with COVID-19 samples: | 68 | 64.8% |
| In case dealing with COVID-19 samples, the medical laboratory technician had got COVID-19 as a result. | 50 | 47.6% |
| Medical laboratory technician was immunized against Hepatitis A: | 65 | 61.9% |
| Medical laboratory technician was immunized against Hepatitis B: | 75 | 71.4% |
| Medical laboratory technician was immunized against Tuberculosis: | 37 | 35.2% |
| Medical laboratory technician was immunized against COVID-19: | 67 | 63.8% |

Regarding the behavior of medical laboratories staff toward hand hygiene practice, 51.4% of the workers reported that they preform hand hygiene before and after laboratory procedure as it is presented in **e.g. Table 4,** and 61.9% apply it after removing gloves, while 37.1% clean their hands after handling solid materials, 49.5% were washing their hands before and after handling clients/each patients, and 41.9% perform hand hygiene after handling biological sampling and other hazardous.

Table 4. Hand hygiene practice for medical laboratory staff

| Hand hygiene practice: | Frequency | Percentage % |
|---|---|---|
| Before and after laboratory procedure: | 54 | 51.4% |
| After removing gloves: | 65 | 61.9% |
| After handling solid materials: | 39 | 37.1% |
| Before and after handling clients/each patient: | 52 | 49.5% |
| After handling biomedical samples and other hazardous: | 44 | 41.9% |

### *3.6 Factors hinder the implementation of good OSH practice*

As presented in Table 5 below, participants reported several factors that affect good practice behavior in the workplace. 61% of the respondents reported that their laboratory has a poor design, which could lower their performance and increase the level of stress experienced by the laboratory staff. Participants also reported that 58.1% of the laboratory staff are ignorant or lack awareness of safety guidelines, and 49.5% of the medical laboratories reported a lack of Personal Protective Equipment (PPE). Additionally, 50.5% of the laboratories had inadequate resources and infrastructure. 55.2% of the participants reported receiving proper and adequate training in occupational health and safety, while 56.2% observed a negative attitude towards occupational health and safety. Furthermore, 56.2% reported that their laboratories had poor working conditions, leading to ergonomic hazards and other risks.

Table 5. Factors that hinder the implementation of good practice in OSH

| Factors hindering OSH: | Frequency | Percentage % |
|---|---|---|
| Poor design of the laboratory: | | |
| 1. Yes | 64 | 61% |
| 2. No | 41 | 39% |
| Ignorance/lack awareness of the workers: | | |
| 1. Yes | 61 | 58.1% |
| 2. No | 44 | 41.9% |
| Lack of Personal Protective Equipment; | | |
| 1. Yes | 52 | 49.5% |
| 2. No | 53 | 50.5% |
| Inadequate resources/infrastructure: | | |
| 1. Yes | 53 | 50.5% |
| 2. No | 52 | 49.5% |
| Inadequate training of occupational health and safety | | |
| 1. Yes | 58 | 55.2% |
| 2. No | 47 | 44.8% |
| No policy on occupational health and safety: | | |
| 1. Yes | 48 | 45.7% |
| 2. No | 57 | 54.3% |
| Negative occupational health and safety: | | |
| 1. Yes | 59 | 56.2% |
| 2. No | 46 | 43.8% |
| Poor ergonomics (working conditions): | | |
| 1. Yes | 59 | 56.2% |
| 2. No | 46 | 43.8% |

## 4. Discussion

### *4.1 Demographic characteristics*

The study finding indicates that the respondents comprised of females (57.10%) more than males (42.90%). The study were not the same as with the finding of (Tait, 2019) which indicates that among 200 respondents of medical laboratory staff that the percentage of males respondents were (51.5%) and females respondents were (48.5%). However, we found that the finding of (Ndejjo et al., 2015) agreed with this finding where the respondents of males were (28.5%) and respondents of females were (71.5%), the study aimed for the determination of occupational health toward hazards faced by health staff including laboratory staff, in additional to mitigation measures for hazards (Ndejjo et al., 2015). Regarding the level of education of medical laboratories staff, this study finding reported that

most of the participants were having a diploma level of certificate (43.80%) which agreed with (Tait, 2019) who reported that majority of the respondents were diploma level of education as well (78.43%), same study indicates that (50%) of the participants were having 2-5 years of experience while this study reported that 1-5 years were also the most year of experience among our respondents with a percentage of (30.50%).

*4.2 Biological hazard*

The finding of our study were same as with (Ndejjo et al., 2015) which focused on occupational hazards among health staff including laboratory staff in the city of Kampala, Uganda whose their finding indicates most of the respondents reported their exposure to bacteria with a percentage of (39.5%), while this study indicates (39.45%) of the participants were reported their exposure to bacteria. However, the exposure of medical laboratories staff toward fungi and virus were inconsistent with (Tait, 2019) whose reported exposure their participants to (8%) to virus and (17%) to fungi, while this study indicates a percentage of (22.02%) to virus and (14.22%) to fungi.

*4.3 Physical hazard*

This study sought to assess the exposure of medical laboratories staff to physical hazards. The finding of the study were different from the study (Tait, 2019) which a focused on occupational safety and health status in medical laboratories in Kajiado, Kenya, the study indicates that medical laboratory staff were exposed to (9.31%) noise exposure while this study findings indicates that participants reported they exposure to noise exposure by percentage of (24.56%). The study of (Gestal, 1987) were reported that (23%) of medical laboratory staff are exposed to electricity related hazards, which agreed with this study finding which indicates (26.32%) of the participants are exposed to electricity related hazards. The study of (Alshalani & Salama, 2019) indicates laboratory staff were exposed to electricity hazards (92.9%) agreed with this study which indicates laboratory staff exposed to (26.32%) of electricity hazards. Same study also indicates that laboratory equipment dangerously placed reported by a percentage of (49.51%), while this study the finding to the same variable is (14.47%).

*4.4 Chemical hazards*

The findings of this study were different of the findings of (Tait, 2019) regarding the exposure to chemical hazards, the study conducted in Kajiado, Kenya were reported they exposure to flammable and combustible liquids and solids is (15.2%) while the participants of this study reported their exposure to flammable and combustible liquids and solids is (33%). Study of (Tait, 2019) were also indicates the handling of in-labeled and un-marked chemical was reach (38.24%), while this study reported it (25.62%).

*4.5 Control measures*

This study finding indicates (82.9%%) of medical laboratory staff were reported to having a proper mechanism for disposing of medical waste, which agreed with (Tait, 2019) whose reported the availability of waste disposal by a percentage of (92.6%). According to (Alshalani & Salama, 2019) indicates a high lack of personal protective equipment (92.9%) which is not the same with this finding that indicates the medical laboratories staff were provided with PPE (94.3%). The finding of (Tait, 2019) were not the same regarding the first aid equipment (36.8%) with this study findings which indicates that (92.4%) of medical laboratory staff were reported that they have a first aid kit at their laboratories. The study of conducted if Kajiado, Kenya indicates that they had a chemical hygiene plan (25%) which is

does not agreed with this study finding (83.3%). Regarding the screening of HIV, (Tait, 2019) indicates (87%) of the participants were screened for HIV and (72%) out of them were provided with PEP, while this study indicates (63.8%) of the participants were reporting to have HIV screening and (46.7%) out of them were provided with PEP.

Comparing to hand hygiene practice of medical laboratories staff of (Tait, 2019) with this study findings, they reported (87.7%) of their medical laboratory staff were washing hands before and after each procedure in the laboratory while this study indicates (51.4%), their reported after removing gloves (67.2%) which agreed with this study finding (61.9%), while the study of (Tait, 2019) participants reported a percentage of (82.8%) of medical laboratory staff were washing their hand after handling solids materials, while this study finding reported (37.1%), and regarding before and after handling patients and after handling biomaterials and other hazardous materials they reported (45.6%) and (72.5%) respectively, this study participants reported (49.5%) and (41.9%) respectively for the same variables. According to (Tait, 2019), they provided hepatitis A vaccination with a percentage of (36%)., and hepatitis B vaccination (82%). In our study, medical laboratory staff were provided of hepatitis A vaccine (61.9%), and provided of hepatitis B vaccine was (71.4%).

### *4.6 Factors hinder the implementation of good OSH practice*

The findings of this study were not agreed with (Tait, 2019) regarding the poor design of the laboratory (39.7%) while this study participants reported that their medical laboratories were having proper design with a percentage of (61%). As well as the ignorance/lack of awareness, the study of conducted if Kajiado, Kenya indicates (26.5%), while this study reported (58.1%) were not having enough knowledge and awareness for preventing them from occupational hazards. There found to be a differences between this study finding and (Tait, 2019) regarding the lacking of Personal Protective Equipment (PPE) among both participants from the two studies, (Tait, 2019) indicates (8.8%) while this study participants reported (49.5%).

## 5. Conclusion

This research concluded that bacteria are the most common type (39.45%) of biological hazards, while the most common types of chemical hazards in medical laboratories were flammable and combustible liquids and solids (33%), and in physical hazards, the most hazard was electricity related to hazards by (32.66%) were most of the participants of the Saudi nationality, with a percentage of (87.60%) with a diploma level of education. The research also concluded that poor design was the most important factor hindering good practice in medical laboratories (61%), followed by lack of awareness about safety procedures in the laboratory (58%). Personal protective equipment was one of the most factors in which lack of interest occurred (50.5%). Through this research, we concluded that there are no policies related to medical laboratories in terms of occupational health and safety. There was neglect about this matter, which may negatively affect medical laboratories and their practice of work. There are many studies related to laboratory technicians in factories and a great focus on their safety procedures, but On the other hand, medical laboratory technicians have had very few studies, especially in the Kingdom of Saudi Arabia in the eastern region, on safety procedures for them because they are exposed to many and varied risks. Medical laboratories and occupational safety are given the least priority in the health sector. One of the recommendations is to raise awareness among medical laboratory technicians about safety and health procedures, and to explain the hazards they are most exposed to in order to be prevented. Conducting continuous training on safety procedures and conducting intensive courses for medical laboratory technicians in order to reduce the risks

they are exposed to and how to deal with them. Also, the presence of a checklist by the supervisors of medical laboratories, and to ensure the presence of safety equipment that makes practice safe in medical laboratories. Recommendation for future research to investigate the relationship in relation to each environmental hazard and exposure.

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