Asian Jr. of Microbiol. Biotech. Env. Sc. Vol. 25, No. (2) : 2023 : 190-205

ISSN-0972-3005

DOI No.: http://doi.org/10.53550/AJMBES.2023.v25i02.003

EVALUATION OF BIOSAFETY ASSESSMENT AMONG LABORATORY STAFF IN SELECTED HOSPITALS AND DIAGNOSTIC CENTERS AT JASHORE DISTRICT IN BANGLADESH

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(Received 15 December, 2022; Accepted 24 January, 2023)

Key words: *Bio-safety, Laboratory safety, Laboratory quality, Universal work precautions, Bio-hazards, Public health.*

Abstract–Medical laboratories staff are exposed to professional bio-hazards on a regular basis if proper protective standards are not put in place, both their health and safety may be at danger. The initiative of this study is based on the articulation of the knowledge, attitude and practice regarding biological hazards among the laboratory staffs. Innumerable accidents happen due to lack of sufficient information about laboratory safety procedures, a callous attitude, and incorrect administration in the laboratory. This study was carried out among the staff of selected Hospitals and Diagnostic Centers at Jashore region to evaluate the KPA of laboratory bio-safety. In both approaches and manner, a descriptive cross-sectional survey was conducted among 192 laboratory staff from 52 Hospital and Diagnostic Centers. Data was gathered from a structured self-observed questionnaire and checklist, which were created and evaluated based on existing research and guidelines on universal work considerations. A total of 192 staffs who consented were included in the study. Where 150 (78.1%) male and 42(19.9%) female. 116 (64.4%) were 20-30 years age group, 49 (25.5%) were over 10 years of experience and 129(67.2%) married respondents. In the study 166 (86.5%) respondents work more than 8 hours in the lab and 59 (30.7%) were overweight. 66(34.4%) of staff have good knowledge on bio-safety, good attitude and practice 46 (24%) and 25(13%) on bio-safety respectively. Within the demographic information observed, only the working hour displayed significant (p=0.000) influence on the bio-safety knowledge. Age of the worker (p=0.000) and experience (p=0.001) had great influence on bio-safety attitude. Among the participants 104 (54.2%) received formal safety training and 155(80.7%) aware about universal work precaution. 145 (75.5%) never washed hands before putting gloves and 70(36.5%) always used PPE. Average (Mean ± SD) of laboratory staff knowledge, practice and attitude 71.72±10.40, 63.21±12.16 and 70.68±14.20 respectively. Overall, the data suggest that good knowledge and attitude to bio-safety practices between lab staff was indicated and their practices need to be more improved. Arrangement of training programs, proper monitoring and sticking to legislation must be implemented by the governance body to rise conversance of the laboratories staff about strict laboratory techniques and bio-hazards.

INTRODUCTION

Since the early 20th century, infections from laboratories have grown to be a major issue worldwide (Coelho and Díez, 2015a). Staff frequently faced with various occupational dangers and if proper defensive procedures are not used, both health and safety may be seriously jeopardized (Hofmann *et al*., 2017; Juma *et al*., 2014; Tompa *et al*., 2016). It is necessary for clinical Laboratory staff who collaborate biological pathogens and work with other pathogen(WHO, 2018). In general, these hazards might be physical, chemical or biological (Alshalani and Salama, 2019; Hill, 2007). Numerous hazards are involved at every step in the medical and diagnostic laboratories. Laboratory staffs handling clinical samples containing a large number of contagious organisms have a significant risk of developing infections acquired in the lab. Those who work in microbiological laboratories are at a higher risk than others (Aksoy *et al*., 2008). Adherence to standard precautions is crucial for all medical staff usually and especially lab staff are potentially blooming chance to grown risk of getting

infectious diseases which include human immunodeficiency virus (HIV), hepatitis B virus (HBV), and regards to illness outbreaks and epidemics like Ebola and Lassa fever that frequently have lethal sequel (Driscoll *et al.*, 2005). Individuals surveyed were committed in India, (Shekhar *et al*., 2015) Ghana, (Akagbo *et al.*, 2017), Pakistan, (Nasim *et al*., 2012) and Yemen (Al-Abhar *et al*., 2017). In addition, a different research was driven in a diagnostic laboratory at Shaqra University expressed that laboratory staff need to increase their knowledge and it is their duty to follow biosafety policy and use personal protective equipment, and biosafety manual (Cruz *et al.*, 2015). Arnold Wedium, who is regarded as the originator of modern bio safety (BS), originally addressed the topic in the biological research laboratory of the US army in Fort Detrick, Maryland (Abhayaratne *et al*., 2010). The first precise microbiological practice guideline were released by the National Institute of Health in the USA in 1976. WHO established guideline later in 2014, to provide a secure environment in and around every laboratory worldwide (Abhayaratne *et al.*, 2010). In Asian region, India is one of the nations with codified biosafety regulations (Chathuvedi, 2006). Biosafety is a major issue in clinical labs around the world, particularly in under developed nations which lack of standard operating procedures (SOPs). In laboratories, biological and chemical risks are risen from a variety of sources and activities, such as aerosol exposure, spills and splashes, unintentional needle sticks, wounds from keen instruments and crushed glass, mouth pipetting, and centrifuge mishaps (Tietjen L, Bossemeyer D, 2010). Aerosols and blood borne viruses both are critical biohazard concerns for laboratory staff (Coelho and Díez, 2015b). In accordance with WHO, around 3 million HCP (Health Care Provider) worldwide are percutaneous blood-borne microb; susceptible are responsible for 2.5 percent of HIV infections and 40 percent of Hepatitis-B and Hepatitis-C cases among medical professionals globally (Ekaete Alice *et al*., 2013)**.** The containment concepts, methods, and procedures used in laboratories to minimize unintended exposure to infections and poisons or their unintentional discharge have been described to as laboratory biosafety (Oladeinde *et al*., 2013). In different regions of the world, a number of diseases linked to laboratories have emerged, employing both known and previously unidentified substances (Gaudioso and Zemlo, 2007). The safety of the lab staff may not be always assured by the use of defensive cloth and safety equipment alone. The laboratory staff should constantly be protected from the danger of infections related to the laboratories by a mix of rules and methods. The improper suppression and improper disposal of biological wastes provide a risk of infection to patients, healthcare workers, and the general public (Oladeinde *et al.*, 2013). Additionally, studies have linked proper room ventilation to a lower risk of contracting an airborne virus in healthcare facilities (Knibbs *et al.*, 2011). Proper governance with assessment of clinical laboratories for the availability of bio-safety instrument and consent value with standard bio-safety initiatives not only encourage a secure working circumstance but may also have a significant impact on maintaining high-quality laboratory service. Additionally, Sustainable Development goals (SDG) have emphasized the importance of safe environment in hospital and diagnostic center settings (Abhayaratne *et al*., 2010). The primary objectives of this research is to assess the KPA of laboratory staff on bio-safety in selected healthcare institutions in Jashore district Bangladesh.

METHODOLOGY

Study area

The study was conducted at randomly selected hospital and diagnostic center in Jashore district, Bangladesh. The rationale of choosing the place was to collect proper information from target population during the adequate time of data collection.

Study Design

In this cross-sectional study, knowledge, attitudes, and practices related to laboratory bio-safety, accident and waste disposal in the laboratories among the selected hospital and diagnostic centers were surveyed using a standardized, structured, self-administered questionnaire.

Study period

The study, which covered study design, questionnaire preparation, literature evaluation, data collecting, data analysis, and write up, was conducted between February 2022 to August 2022.

Study population and sample selection criteria

The study population was the laboratory staff who are working in the selected hospital and diagnostic

centers and intending to take part in the study, during the study period. The participants were selected by using simple random sampling and all the laboratory personnel were tried to include in the study.

Sample size

192 samples were collected from 52 different selected hospital and diagnostic centers

Questionnaire development and data collection

A paper based questionnaire was developed to collect the required information about laboratory safety, accident and waste management of the lab. After finalizing the questionnaire, it was pretested to ensure its efficiency as a tool to collect required data such as whether or not the words used are understandable by the respondents. Respondents were randomly selected from the selected hospital and diagnostic center who gave verbal consent to the study. "Bengali" the respondents' mother tongue, was used to pose the questions, while English was used to interpret their answers. Accurately identified the needed changes and modification were done in the questionnaire. A questionnaire was developed and pretested prior to the main study. There were 78 questions in total, divided into four sections: (1) demographics, (2) knowledge, (3) Practices, and (4) Attitude. The first section was about the Age, gender, Designation, Years of experience, marital status, educational level, working hours in the laboratory per day and Body mass index (BMI). The section-[22] of the questionnaire is related to laboratory staff knowledge towards bio-safety. Knowledge section consisted of 27 items, each with "two" workable options. In order to lessen answer bias, A alternative choice response covered yes or no options (1=yes & 0=no) and it was required to examine and score respondents broad knowledge of prospective laboratory bio-safety. Score range was 0 to 27. Section-[222] consists 19 questions toward practice, that would indicate laboratory staffs' practices towards bio-safety. 19 questions that the respondents had to answer with a 3-point Likert scale (2 = always, 1= sometimes, 0 = never) were used. The range of scores was 0 to 38. Whereas Part It included 24 questions related to laboratory staff attitudes to laboratory bio-safety. Lab workers were requested to reveal their equilibrium of assent to the description using a 3-point Likert-scale (2 = Strongly-agree, 1=agree, and 0 = disagree). The scale went from 0 to 48. The KPA scores were multiplied by 100. The score less than 50 were indicating a poor, Scores between 50-75 were regarded as the median (average), and score over 75 showing good bio-safety KPA level, respectively. Figure 1 Illustrate the overview of the methodology.

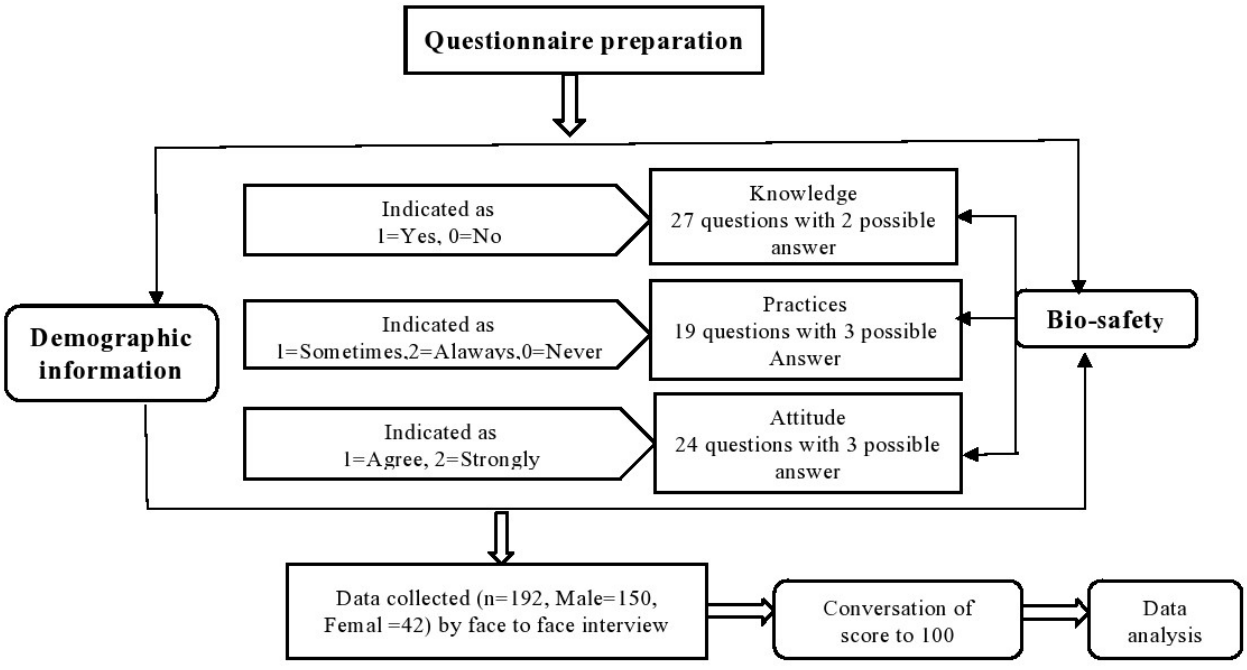

Fig. 1. Methodology over view of the study.

Data Analysis

Survey data has been entered into version 25 of the SPSS. Once the data entry was finished, the team checked the data quality and found any miscode or any other anomaly to be changed before statistical analysis, SPSS version 25 performed both descriptive and multivariate analysis. Both descriptive and inferential statistical analysis were employed during data analysis. To display demographic variables and address the results about the level and distribution, we utilized frequencies (n), percentages (%), mean value (M), and standard deviation (SD) of Knowledge, practices and Attitude of selected hospital and diagnostic center's laboratory staff. Chi-square test, Pearson linear correlation, Spearman correlation, independent sample t test were used to find out the relationships across various variables. $P \leq 0.05$ was used to indicate statistical significance at a 95% confidence level.

RESULTS

Socio-demographic characteristics of laboratory staff

The socio-demographic characteristics are reported in Table 1. 192 participants who consented were included in the study and the datasheets were collected from them to analysis for the results. Study comprising 32 Lab in-charges, 56 Lab technologists, 33 Laboratory Technicians, 24 Biochemist, 20 Computer operator, and 27 Lab assistant from whom the socio-demographic data and knowledge, attitude and practice preform was collected. Table 1 shows that mostly 150 (78.1%) of the (n=192) respondents were male and 129(67.2%) participants married. Where we found 68(35.4%) had 3 -<5 y of experience, while 49 (25.5%) had more than 10 years of experience.

About 166(86.5%) staff work in the laboratory more than 8 hour per day and only 3(1.6%) of staff work 1-2 hours per day. We also found mostly 116(60.4%) of participants age between 20-30 years, and only 1(.5%) participant age above 50 years. Among the participants 26(13.5%), 102(53.1%), and 16(8.3%) completed their HSC, Diploma, and Master's degree respectively. We also found that 51%, 30.7%, and 10.9% of respondents were normal weight, overweight, and obese, respectively, based on the BMI health evaluation.

Table 1. Socio-demographic characteristics of laboratory-staffs.

Characteristic	Frequency (n)	Percentage (%)
Gender		
Male	150	78.1
Female	42	19.9
Age		
<20	12	6.3
20 to 30	116	60.4
31 to 40	53	27.6
41 to 50	10	5.2
> 50	1	.5
Designation		
Lab in-charge	32	16.7
Lab technologist	56	29.2
Lab technician	33	17.2
Biochemist	24	12.5
Computer operator	20	10.4
Lab assistant	27	14.1
Education level		
SSC	21	10.9
HSC	26	13.5
Diploma	102	53.1
Honors	26	13.5
Masters	16	8.3
MBBS	1	.5
Years of experience		
<3	46	24
3 -<5 y	68	35.4
5 – 10	29	15.1
> 10 y	49	25.5
Marital status		
Married	129	67.2
Unmarried	63	32.8
Working hour in the laboratory per day		
1 to 2	3	1.6
3 to <5	6	3.1
5 to 8	17	8.9
more than 8 (in hours)	166	86.5
BMI (kg/m^2)		
Underweight (<17.5)	14	7.3
Normal weight (17.5-22.99)	98	51
Overweight (23-27.99)	59	30.7
Obese (>28)	21	10.9

Note: BMI=Body Mass Index, SSC=Secondary School Certificate, HSC= Higher Secondary Certificate, MBBS= Bachelor of Medicine and Bachelor of Surgery.

Bio-safety knowledge of respondents

Bio-safety knowledge of laboratory staffs is exhibited in Table 2. In order to preserve personal protection, 192 (100%) of the surveyed staff know about the importance of taking vaccine when

working in the lab. 150 (78.1) staff know laboratory room, shelves and equipment needs to be always clean to create good working environment in the laboratory and 42 (21.9%) staff is not conscious about this, 182(94.8%) of the surveyed staff know the use of emergency safety equipment, 104 (54.2%) surveyed staff received safety training, 55 (80.7%) staff aware about universal work precautions. 61 (31.8%), 62(32.3%) understand what to do in the event of a sharp injury or a chemical splash to the eyes respectively. The majority of laboratories have biosafety and safety equipment specifications installed. For example, 137(71.4%) respondents know Procedures for securely administering blood and blood products are available in the laboratory, 190 (99%) gave positive response to biomaterials with prominent labels, including the hazard symbol as necessary in the lab, 167(87%) respondents know hand washing sinks clean and unobstructed in lab, 167 (87%) know hazardous trash containers with the contents identified. 178 (92.7%), 160 (83.3%), 161 (83.9%), and 167 (87%) respondents gave positive response to containers are compatible with waste in the laboratory, shattered glass is disposed off in separate containers in the laboratory, Waste is properly separated and stored away from drains,

Table 2. Assessment of bio-safety knowledge among respondents.

Statement	Yesn (%)	Non (%)	P-value	Mean±SD
1. Laboratory room, shelves and equipment needs to always clean.	150(78.1)	42(21.9)	.000	.78±.414
2. Procedures available for safely dispensing blood and blood products in the laboratory.	137(71.4)	55(28.6)	.000	.71±.453
3. All biomaterials clearly labelled, including the hazard symbol where appropriate in the lab.	190(99)	2(1)	.000	.99±.102
4. Need to keep the equipment/chemical at place every time after using it.	144(75)	48(25)	.000	.75±.434
5. Need to keep all the solution/equipment/ sample properly leveled	160(83.3)	32(16.7)	.000	.83±.374
6. Hand washing sinks clean and unobstructed in lab.	167(87)	25(13)	.000	.87±.337
7. Liquid chemical waste is not disposed of in the sink.	165(85.9)	27(14.1)	.000	.86±.349
8. Waste containers labeled with the contents, "Hazardous Waste".	167(87)	25(13)	.000	.87±.337
9. Containers are compatible with waste in the laboratory.	178(92.7)	14(7.3)	.000	.93±.261
10. Separate disposal containers available for broken glass in the laboratory.	160(83.3)	32(16.7)	.000	.83±.374
11. Waste is segregated and stored appropriately away from drains.	161(83.9)	31(16.1)	.000	.84±.369
12. All hazardous chemical waste is arranged to be picked up by safety department	167(87)	25(13)	.000	.87±.337
13. Chemical containers clearly labeled with contents	163(84.9)	29(15.1)	.000	.85±.359
14. Know how to use emergency safety equipment	175(91.1	17(8.9)	.000	.91±.285
15. Are you Aware of Universal Work Precaution?	155(80.7)	37(19.3)	.000	.81±.395
16. Do you know what should be done in case of sharp injury?	61(31.8)	131(68.2)	.000	.32±.467
17. Do you know what should be done if any chemicals splash to the eyes?	62(32.3)	130(67.7)	.000	.32±.469
18. Do you know handling of blood stained non-reusable materials?	122(63.5)	70(36.5)	.000	.64±.483
19. Do you ever have Injury while working in lab?	60(31.2)	132(68.8)	.000	.31±.465
20. you ever notice/witness human negligence accident happened ever in your laboratory	93(48.4)	99(51.6)	.000	.48±.501
21. You know how to report any type of injury to the authority.	64(33.3)	128(66.7)	.000	.33±.473
22. There any accident record facility in your laboratory.	150(78.1)	42(21.9)	.000	.78±.414
23. Received any Formal safety training	104(54.2)	88(45.8)	.000	.54±.500
24. Any physical obstacles in moving about in work areas.	8(4.2)	184(95.8)	.004	0.04±.200
25. Laboratory have a manual for proper waste handling, storage, and disposal facility.	181(94.3)	11(5.7)	.000	.94±.233
26. You know how to use emergency safety equipment (eyewash unit, safety showers, fire extinguisher, fire blanket, first aid kit) in your lab?	182(94.8)	10(5.2)	.000	.95±.233
27. Take any vaccine (Tuberculosis, Tetanus, Hepatitis-B, & Others).	192(100)	0(00)	0	1.00±.000[a]

Note: a,t cannot be computed because the standard deviation is 0. SD= Standard Deviation, p=Significance Value.

and the safety department is arranged to collect all hazardous chemical waste respectively. 60(31.2%) of total (n=192) respondents injured when they are working in the laboratory and 132(68.8%) respondents never had any type of injury. Surprisingly, among the respondents 128(66.7%) of respondents does not know the process how to report any type of injury to the authority. The results of bio-safety awareness of laboratory provides an overview of staff members' demographic features in Table 3. Respondents 34.4% (66/192) demonstrating that they have sufficient knowledge scored (≥75) about biosafety. 63.5% (122/192) had medium knowledge about bio-safety as the scored (≥50-<75), and only 2.1% (4/192) had insufficient knowledge as they scored <50. Most responders in the 20–30 age

Table 3. Effect of socio-demographic information on the bio-safety knowledge of laboratory staffs.

Characteristic	Number of respondent's n (%)			P-value	Mean ± SD	Range
	Poor (<50)	Medium (≥50-<75)	Good (≥75)			
Gender						
Male	3(2)	97(64.7)	50(33.3)	0.829	71.19±10.50	33.33-96.30
Female	1(2.4)	25(59.5)	16(38.1)		73.63±9.92	48.15-92.59
Age (years)						
<20	0(0)	9(75)	3(25)		70.37±7.23	55.56-81.48
20 to 30	3(2.6)	73(62.9)	40(34.5)		71.64±10.71	33.33-92.59
31 to 40	1(1.9)	33(62.3)	19(35.8)	0.984	71.98±10.28	37.04-92.59
41 to 50	0(0)	6(60)	4(40)		73.33±12.19	51.85-96.30
>50	0(0)	1(100)	0(0)		66.67±00	0-66.67
Designation						
Lab in-charge	1(3.1)	18(56.3)	13(40.6)		72.69±10.42	37.04-88.89
Lab technologist	0(0)	34(60.7)	22(39.3)		72.08±9.37	51.85-88.89
Lab technician	0(0)	20(60.6)	13(39.4)	0.075	72.72±9.11	55.56-88.89
Biochemist	000)	13(54.2)	11(45.8)		76.54±9.63	59.26-96.30
Computer operator	1(5)	17(85)	2(10)		69.44±7.87	48.15-85.19
Lab assistant	2(7.4)	20(74.1)	5(18.5)		65.98±13.74	33.33-92.59
Educational level						
SSC	0(0)	18(85.7)	3(14.3)		69.49±8.36	51.85-88.89
HSC	0(0)	21(80.4)	5(19.2)		70.37±9.01	51.85-92.59
Diploma	2(2)	63(61.8)	37(36.3)		71.64±10.39	33.33-96.30
Honors	1(3.8)	11(42.3)	14(53.8)	0.081	74.22±11.26	48.15-92.59
Masters	1(6.3)	9(56.3)	6(37.5)		72.91±13.70	33.33-88.89
MBBS	0(0)	0(0)	1(100)		77.78±00	77.78-77.78
Years of experience						
<3	1(2.2)	29(63)	16(34.8)		72.38±8.89	48.15-88.89
3-<5	2(2.9)	45(66.2)	21(30.9)	0.857	70.37±11.76	33.33-88.89
5-10	1(3.4)	16(55.2)	12(41.4)		72.41±10.50	37.04-92.59
>10	0(0)	32(65.3)	17(34.7)		71.72±10.40	51.85-96.30
Marital status						
Married	3(2.3)	78(60.5)	48(37.2)	0.446	72.89±10.74	33.33-96.30
Unmarried	1(1.6)	44(69.8)	18(28.6)		69.31±9.32	48.15-88.89
Working hour/ day						
1 to <3	1(33.3)	0(0)	2(66.7)		65.43±28.04	33.33-85.19
3 to <5	1(16.7)	3(50)	2(33.3)	0.000**	64.81±16.85	33.33-77.78
5 to 8	1(5.9)	10(58.8)	6(35.3)		69.06±13.79	37.04-88.89
>8	1(0.6)	109(65.7)	56(33.7)		72.36±9.23	48.15-96.30
BMI (kg/m²)						
Under-weight (<17.5)	0(0)	9(64.3)	5(35.7)		73.54±7.24	59.26-85.19
Normal weight(17.5 -22.99)	0(0)	67(68.4)	31(31.6)		72.10±9.26	51.85-96.30
Overweight(23-27.99)	3(5.1)	36(61)	20(33.9)	.226	70.75±12.31	33.33-92.59
Obese (>28)	1(4.8)	10(47.6)	10(47.6)		71.42±11.78	33.33-8148
Total	4(2.1)	122(63.5)	66(34.4)		71.72±10.40	33.33-96.30

range fell into the good category of Biosafety knowledge. This study found that only the number of hours per day spent working in the lab had a significant (p = 0.000) impact on the participants' understanding of Biosafety. No significant differences were found with regard to gender, age, experience level, job title, educational attainment, marital status, or BMI. 16(38.1%) of female and 50 (33.3%) of the male respondents fell into the group of having strong understanding of Biosafety.

The biggest percentage of respondents 56(33.7%)—who worked more than eight hours per day had a strong understanding of biosafety, and 40(34.5%) of the staff members in the 20–30 age range fell into the category of having a strong understanding of bio-safety. Their knowledge of biosafety was unaffected by their experience year (p=0.857). About two thirds of the laboratory staff 122 (63.5%) scored at a moderate level of bio-safety expertise, while 66 (34.4%) scored at a good level. Range also shows that sellers individually accomplished average Mean ± SD is 71.72±10.40 and minimum 33.33 and maximum 96.30 bio-safety knowledge score.

Bio-safety practices of the laboratory staff

The bio-safety practices of the laboratory staff studied are shown in Table 4. The majority of the workers handled and processed specimens in a safe manner by adhering to excellent lab practices. The majority also know how to disinfect the lab spaces. However, 2(1%) used to eat or drink in the lab, 3(1.6%) stored food items in the lab refrigerator, 85(44.3%) used cosmetics and 23 (12%) used mobile phones in the lab. In the study no one reported to continue working with smoke and bite nail while working in the laboratory. Disappointingly, 85(44.3%) respondents never wear PPE while working in the laboratory, 115(59.9%) of the respondents practice mouth pipetting. 33(17.2%) of

Table 4. Assessment of bio-safety practice among respondents.

Statements	Always n(%)	Sometimes n(%)	Never n(%)	P-value	Mean ±SD
1. Avoid Eat or drink in laboratory	78(40.6)	112(58.3)	2(1)	.000	1.40±.511
2. Avoid Store food item (you are supposed to eat) in the lab refrigerator	106(55.2)	83(43.2)	3(1.6)	.000	1.54±.530
3. Avoid Put cosmetics(any kind) while working in the laboratory	41(21.4)	66(34.4)	85(44.3)	.000	.77±.779
4. Avoid Smoking while working in the laboratory	100(100)	0(0)	0(0)	0	2±.000[a]
5. Avoid Cut your nail with teeth while working in laboratory	107(55.7)	85(44.3)	0(0)	.000	1.56±.498
6. Avoid Practice Mouth pipetting (use the pipette by mouth)	31(16.1)	46(24)	115(59.9)	.000	.56±.756
7. Wear any type of the PPE while working in the laboratory	74(38.5)	33(17.2)	85(44.3)	.000	.94±.911
8. Frequent use the PPE in the laboratory	70(36.5)	41(21.4)	81(42.2)	.000	.94±.887
9. Use any personal protection while handling acid/sharp material	62(32.3)	23(12)	107(55.7)	.000	.77±.911
10. Wash your hands Before putting on gloves	33(17.2)	14(7.3)	145(75.5)	.000	.42±.768
11. Wash your hands After removing gloves	151(78.6)	39(20.30	2(1)	.000	1.78±.442
12. Always get your working desk clean	110(57.3)	82(42.7)	0(0)	.000	1.57±.49
13. Clean your equipment/glassware after use	157(81.8)	35(18.2)	0(0)	.000	1.82±.387
14. Staffs refrain from using cell phone and bringing personal items (purses, backpacks, books, magazines etc.) into the laboratory	56(29.2)	113(58.9)	23(12)	.000	1.17±.620
15. Staffs refrain from touching eyes, nose, mouth and lips while in the Laboratory	60(31.3)	23(12)	109(56.8)	.000	.74±.905
16. Surfaces in the laboratory regularly disinfected with an intermediate level Disinfectant each day of work	145(75.5)	42(21.9)	5(2.6)	.000	1.73±501
17. Wear apron while working in laboratory	74(38.5)	59(30.7)	59(30.7)	.000	1.08±.831
18. avoid Ware apron/other garments outside of the lab	115(59.9)	65(33.9)	12(6.3)	.000	1.54±.613
19. Waste containers are always sealed	152(79.2)	23(12)	17(8.9)	.000	1.70±.623

Note: a,t cannot be computed because the standard deviation is 0.

the lab staffs reported washing their hands always before putting gloves. 157(81.8%) of staffs always clean equipment/glassware after use and 35(18.2%) staffs sometimes clean. 110(57.3%) of the lab staffs always get their working desk clean and 82(42.7%) sometimes. 33(17.2%) of the lab worker reported washing their hand always before putting on gloves and disappointingly, about two third 145(75.5%) of the total respondents never practices their hand washing before starting work in the lab. During the observation we found most of the staffs 151(78.6%) always practices their hand washing after remove of gloves or end of the works and 39(20.30%) sometimes used. Additionally, 109 (56.2%) laboratory workers never follow the precaution to avoid touching their mouths, noses, or lips while working there and 115(59.9%) always avoid wearing apron/other garments outside of the lab those they used in the laboratory.

Table 5 provides a summary of the laboratory staff's bio-safety activity ratings in relation to their sociodemographic traits. In terms of biosafety practices, about 13 (8.7%) of the male and 6 (14.3%) of the female staff fell into the poor group. We discovered, in an interesting finding, that staff members under the age of 20 and those over the age of 50 did not have poor practice while the majority of 16 (13.8%) aged 20-30 years had high good practice status. There was only two secondary educated lab worker, who had good score on bio-safety practices. Laboratory staffs who have completed their master's degree had lowest poor bio-safety practice level and highest mean of bio-safety practice score than secondary passed staffs. We found there was no significant difference ($p \leq 0.05$)) with their practices towards socio-demographic characteristic. We also found mostly 21(12.7%) of staffs works in the lab above 8 hours/day belonged to the good category of bio-safety practices as they scored ≥75. Unmarried lab staffs had lower practices score than married lab staffs. Moreover, 0% of underweight lab staffs had good bio-safety practice and only 2(9.5%) of obese lab worker had good bio-safety practice. Additionally, range shows that each member of the lab staff achieved a bio-safety practices score between 44.74 and 100. Range shows that each vendor attained an average Mean ± SD is 63.21±12.16.

Bio-safety attitudes of laboratory staff

Table 6 represented bio-safety attitudes of the laboratory staffs. All laboratory staff agreed to take vaccine which is very important to their personal lives of which 169(87.5%) strongly agreed. Where no one disagreed with this. All laboratory staff agreed with use of first aid kits and precautions taken in the event of chemical spills and splatters in the laboratory to reduce personal injury and maintain personal health 106(55.2%) of laboratory staff strongly-agreed PPE denied share with others. On the other hand 30(15.6%) respondents agreed to share their PPE with others. Unexpectedly, 107(55.7%) did not know that materials illness can spread with bio-hazards when they practice mouth pipetting in the lab and they strongly believed mouth pipetting is not dangerous for health or would cause illness. 83(43.2%) strongly agreed to wear lab apron during the operations in laboratory. All laboratory staff agreed to minimize bio-hazards and to prevent bio-hazard illness work surfaces must be decontaminated after any spill of potentially dangerous material and at the end of the working day, of which 113(58.9%) strongly agreed. Furthermore, 116 respondents (60.4%) strongly agreed that personal protective equipment (PPE) such as face shields or goggles should be worn while leaking body fluids in order to avoid contact with biohazards and reduce the risk of sickness. Table 7 provides a summary of laboratory staff members' attitudes on biosafety in relation to their demographic traits. Age of respondents ($p=0.000$) and year of experience ($p=0.001$) were shown to significantly ($p \leq 0.05$) differ across laboratory staff members in their views toward biosafety, whereas other parameters had no significant effect. As a result of their scores of 75 or above, 32 (21.3%) men and 14 (3.33%) women fell into the "good" group for biosafety attitude. In relation to their attitude toward bio-safety, the length of the working hours was not statistically significant ($p=0.620$). The majority of laboratory staff, 133 (69.3%), scored at a moderate attitude level for bio-safety, while only 46 (24%) scored at a good attitude level. Additionally, range shows that each vendor attained bio-safety attitude score of 35.42 to 100. Moreover, range allude that laboratory staff individually achieved average Mean ± SD is 70.68±14.20.

Figure 2 displayed that there were a declined propensity in bio-safety KPA score of lab worker. The ultimate knowledge as well as attitude score exceeded the practice score. The KAP scores were 100 times multiplied. The scores less than 50 were indicate as poor, scores between 50-75 were indicate as Medium and the scores over 75 as good. Thus,

our earned Mean ± SD score of knowledge (71.72±10.40) and attitude (70.68±14.20) respectively. Whereas, the practice scores (63.21±12.16) lower than Knowledge and attitude.

The link between the various demographic factors and KAP scores is shown in Table 8. Education level and biosafety knowledge were positively correlated (r =.195**), year of experience (r =.030) and working hour (r =.018). We found negative relation with designation (r =-.171*). In the study we found Significant positive correlation within designation (r =.191b**) and negative correlation with experience and BMI (r = -.108, r = -.109) with bio-safety attitude, whereas education level had no relation with bio-safety attitude. Educational status and practice had a positive

Table 5. Effect of socio-demographic information on the bio-safety practice of laboratory staffs.

Characteristic	Number of respondent's n (%)			P-value	Mean ± SD	Range
	Poor (<50)	Medium (≥50-<75)	Good (≥75)			
Gender						
Male	13(8.7)	116(77.3)	21(14)	0.459	63.45±12.28	44.74-100
Female	6(14.3)	32(76.2)	4(9.5)		62.34±11.83	44.74-97.37
Age (years)						
<20	0(0)	9(75)	3(25)		69.07±15.59	52.63-97.37
20 to 30	8(6.9)	92(79.3)	16(13.8)		64.04±12.40	44.74-100
31 to 40	10(18.9)	38(71.7)	5(9.4)	0.333	60.32±11.07	44.74-100
41 to 50	1(10)	8(80)	1(10)		62.63±7.42	50-76.32
>50	0(0)	1(100)	0(0)		55.26±00	55.26-55.26
Designation						
Lab in-charge	2(6.3)	24(75)	6(18.8)		65.21±12.62	47.37-100
Lab technologist	3(5.4)	47(83.9)	6(10.7)		63.76±12.97	44.74-100
Lab technician	4(12.1)	23(69.7)	6(18.2)	0.438	64.91±12.23	47.37-92.11
Biochemist	1(4.2)	20(83.3)	3(12.5)		61.84±10.49	47.37-97.37
Computer operator	4(20)	14(70)	2(10)		60.65±10.91	44.74-92.11
Lab assistant	5(18.5)	20(74.1)	2(7.4)		60.72±12.21	44.74-100
Educational level						
SSC	4(19)	15(71.4)	2(9.5)		61.27±11.77	44.74-100
HSC	5(19.2)	17(65.4)	4(15.4)		63.15±13.68	44.74-100
Diploma	6(5.9)	84(82.4)	12(11.8)		63.54±12.33	44.74-100
Honors	4(15.4)	17(65.4)	5(19.2)	0.342	63.96±11.66	47.37-92.11
Masters	0(0)	14(87.5)	2(12.5)		62.66±11.29	52.63-97.37
MBBS	0(0)	1(100)	0(0)		60.52±00	60.53-60.53
Years of experience						
<3	5(10.9)	34(73.9)	7(15.2)		63.44±12.79	44.74-97.37
3-<5	6(8.8)	54(79.4)	8(11.8)	0.428	64.28±12.96	47.37-100
5-10	0(0)	25(86.2)	4(13.8)		63.24±9.47	52.63-89.47
>10	8(16.3)	35(71.4)	6(12.2)		61.49±11.97	44.74-100
Marital status						
Married	11(8.5)	103(79.8)	15(11.6)	0.423	62.77±11.72	44.74-100
Unmarried	8(12.7)	45(71.4)	10(15.9)		64.11±13.05	44.74-97.37
Working hour/ day						
1 to <3	0(0)	3(100)	0(0)		60.52±2.63	57.89-63.16
3 to <5	2(33.33)	4(66.7)	0(0)	0.763	53.94±4.92	47.37-60.53
5 to 8	0(0)	13(76.5)	4(23.5)		67.33±13.77	55.26-97.37
>8	17(10.2)	128(77.1)	21(12.7)		63.17±12.12	44.47-100
BMI (kg/m^2)						
Under-weight (<17.5)	2(14.3)	12(85.7)	0(0)		58.83±5.32	50-68.42
Normal weight(17.5 -22.99)	10(10.2)	75(76.5)	13(13.3)		63.77±13.27	44.74-100
Overweight(23-27.99)	5(8.5)	44(74.6)	10(16.9)	0.226	63.42±11.32	44.74-97.37
Obese (>28)	2(9.5)	17(81)	2(9.5)		62.90±12.36	47.37-100
Total	19(9.9)	148(77.1)	25(13)		63.21±12.16	44.74-100

relationship (r = 0.103), BMI (r = .066), and biosafety attitude (r = .041). Whereas designation had negative relation with practice. Hence, knowledge and attitude are positively connected with practice, it is reasonable to assume that as knowledge increases, so will attitude and practice also increases.

DISCUSSION AND CONCLUSION

In this study, 192 samples were collected from 52 different selected hospital and diagnostic center to know about knowledge, attitude and practices toward bio-safety among laboratory staff in Jashore, Bangladesh. The data set was representative of the

Table 6. Assessment of bio-safety attitude among respondents.

Comments	Strongly-agree n(%)	Agree n(%)	Dis-agreen (%)	P-value	Mean ± SD
1. Personal Protective Equipment (PPE) is required only when using chemicals in the laboratory	87(45.3)	36(18.8)	69(35.9)	.000	1.09±.899
2. Safety rules negatively impact productivity	126(65.6)	54(28.1)	12(6.3)	.000	1.59±.607
3. Use of PPE is essential while working in lab	107(55.7)	73(38)	11(5.7)	.000	1.55±.914
4. Do not allow non- laboratory personnel to co-exist within the laboratory	122(63.5)	63(32.8)	7(3.6)	.000	1.60±.561
5. Laboratory doors should be kept closed	148(77.1)	40(20.8)	4(2.1)	.000	1.75±.480
6. Open-toed footwear must not be worn in laboratories	133(69.3)	51(26.6)	8(4.2)	.000	1.65±.559
7. Mouth pipetting should be strictly prohibited	50(26)	35(18.2)	107(55.7)	.000	.70±.856
8. Any kind of Lab Materials must not be placed in the mouth	40(20.8)	53(27.6)	99(51.6)	.000	.69±.796
9. All spills, accidents and overt or potential exposures to infectious materials must be reported to the authority	29(15.1)	28(14.6)	135(70.3)	.000	.45±.743
10. Contaminated liquids must be decontaminated (chemically or physically) before discharge	32(16.7)	28(14.6)	132(68.8)	.000	.48±.765
11. Work surfaces must be decontaminated after any spill of potentially dangerous materials and at the end of the working day	113(58.9)	79(41.1)	0(0)	.000	1.59±.493
12. If laboratory safety procedure is always followed, the number of injury can be reduced	117(60.9)	74(38.5)	1(0.5)	.000	1.60±.501
13. Precautions need to be taken in case of spills and splashes of chemicals	140(72.9)	52(27.1)	0(0)	.000	1.73±.446
14. Use fire extinguisher in case of a fire	128(66.7)	60(31.3)	4(2.1)	.000	
15. Use first aid kits in laboratory	141(73.4)	51(26.6)	0(0)	.000	1.73±.443
16. Store chemicals which need to have special conditions	133(69.3)	57(29.7)	2(1)	.000	1.68±.489
17. Wear lab apron during the activities in laboratory	83(43.2)	27(14.1)	82(42.7)	.000	1.01±.929
18. The adherence to the standard precautions measures has as main objective to protect the health Team	136(70.8)	44(22.9)	12(6.3)	.000	1.65±.596
19. When in contact with blood or any other potential contaminated materials, wash hands immediately.	129(67.2)	55(28.6)	8(4.2)	.000	1.63±.564
20. PPE should not be shared	106(55.2)	56(29.2)	30(15.6)	.000	1.40±.745
21. In blood collection or venipuncture procedures, the use of gloves is required	130(67.7)	54(28.1)	8(4.2)	.000	1.64±.563
22. In procedures where there is a possibility of blood, body fluid, secretion or excretion spilling, personal protective goggles or face shields should be worn	116(60.4)	71(37)	5(2.6)	.000	1.58±.545
23. I feel safe while in the laboratory	123(64.1)	64(33.3)	5(2.6)	.000	1.61±.539
24. Taking vaccination (Tuberculosis, Tetanus, Hepatitis-B,Others) is very important for lab worker.	169(87.5)	24(12.5)	0(0)	.000	1.87±.33

study population because it included people from all areas of the medical laboratories in the Jashore region, as well as people of both sexes, with various educational backgrounds, ages, and age groups. Most of the laboratory staff had solid bio-safety knowledge and moderate practices in terms of safety. Additionally, the majority of lab settings comply with global laboratory safety requirements. However, 88 (45.8%) of the hospital lab staff had never received any prior training in lab safety and this was connected to improper actions like eating and drinking in the labs. 112(58.3%) sometimes and 2(1%) always, and 78(40.6%) never eat in the lab. This result was smaller to another study on lab staffs in India, their finding was (75%) of staffs against eat/ drink in the lab (Shekhar *et al.*, 2015). In other

Table 7. Effect of socio-demographic information on the bio-safety attitude of laboratory staffs.

Characteristic	Number of respondent's n (%)			P-value	Mean ± SD	Range
	Poor (<50)	Medium (≥50-<75)	Good (≥75)			
Gender						
Male	12(8)	106(70.7)	32(21.3)	0.158	69.61±14.05	35.42-100
Female	1(2.4)	27(64.3)	14(3.33)		74.50±14.22	47.92-97.92
Age (years)						
<20	0(0)	4(33.3)	8(66.7)		82.29±14.61	52.08-97.92
20 to 30	8(6.9)	86(74.1)	22(19)		69.86±13.48	35.42-100
31 to 40	4(7.5)	36(67.9)	13(24.5)	0.000****	69.57±14.53	35.42-95.83
41 to 50	0(0)	7(70)	3(30)		74.58±13.95	62.50-97.92
>50	1(100)	0(0)	0(0)		45.83±00	45.83-45.83
Designation						
Lab in-charge	2(6.3)	26(81.3)	4(12.5)		68.94±12.70	39.58-97.92
Lab technologist	4(7.1)	42(75)	10(17.9)		68.08±13.45	35.42-97.92
Lab technician	5(15.2)	19(57.6)	9(27.3)	0.065	69.69±16.70	37.50-100
Biochemist	0(0)	17(70.8)	7(29.2)		73.43±13.51	54.17-95.83
Computer operator	2(10)	14(70)	4(20)		69.79±13.37	41.67-93.75
Lab assistant	0(0)	15(55.6)	12(44.4)		77.54±13.95	58.33-97.92
Educational level						
SSC	1(4.8)	11(52.4)	9(42.9)		76.28±14.33	47.92-97.92
HSC	2(7.7)	19(73.1)	5(19.2)		69.95±12.83	41.67-95.83
Diploma	8(7.8)	75(73.5)	19(18.6)		68.54±13.72	35.42-97.92
Honors	2(7.7)	17(65.4)	7(26.9)	0.366	71.79±16.13	37.50-100
Masters	0(0)	11(68.8)	5(31.3)		74.86±13.61	54.17-97.37
MBBS	0(0)	0(0)	1(100)		93.75±00	93.75-93.75
Years of experience						
<3	1(2.2)	26(56.5)	19(41.3)		77.40±15.14	47.92-100
3-<5	7(10.3)	51(75)	10(14.7)	0.001****	67.31±13.24	35.42-97.92
5-10	0(0)	27(93.1)	2(6.9)		68.10±8.18	58.33-95.83
>10	5(10.2)	29(59.2)	15(30.6)		70.57±15.51	35.42-97.92
Marital status						
Married	7(5.4)	94(72.9)	28(21.7)	0.270	70.46±13.46	35.42-97.92
Unmarried	6(9.5)	39(61.9)	18(28.6)		71.13±15.71	35.42-100
Working hour/ day						
1 to <3	0(0)	2(66.7)	1(33.33)		76.38±15.92	62.50-93.75
3 to <5	0(0)	4(66.7)	2(33.33)	0.620	76.38±15.45	64.58-97.92
5 to 8	1(5.9)	15(88.2)	1(5.9)		67.15±10.73	39.58-97.92
>8	12(7.2)	112(67.5)	42(25.3)		70.73±14.45	35.42 -100
BMI (kg/m^2)						
Under-weight (<17.5)	2(14.3)	9(64.3)	3(21.4)		67.70±13.37	37.50-89.58
Normal weight(17.5 -22.99)	4(4.1)	65(66.3)	29(29.6)	.291	72.95±14.57	37.50-100
Overweight(23-27.99)	4(6.8)	45(76.3)	10(16.9)		69.10±12.69	35.42-97.92
Obese (>28)	3(14.3)	14(66.7)	4(19)		66.46±16.00	35.42-97.92
Total	13(6.8)	133(69.3)	46(24)		70.68±14.20	35.42-100

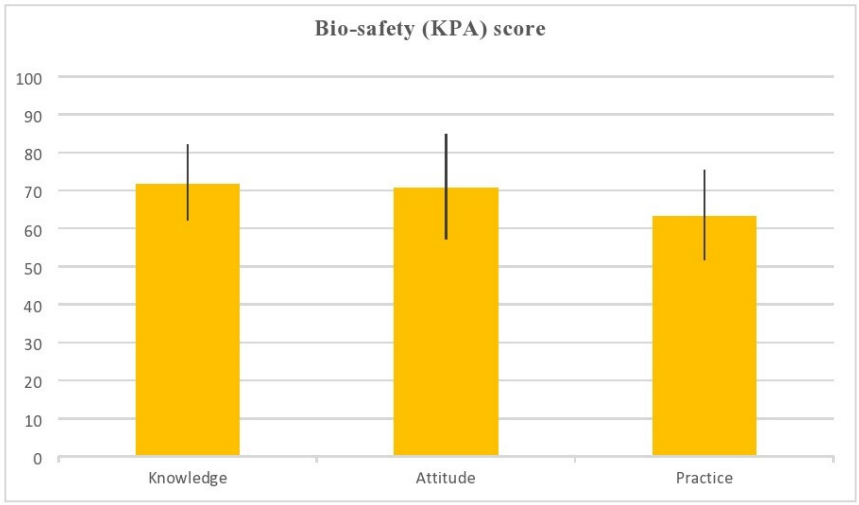

Fig. 2. Bio-safety KPA score (Mean±SD)

research that was conducted by Zaveri and Karia, the finding was (54.4%) of the lab staffs ignore eat/drink in lab (Zaveri, 2012). Where it was seen positive response towards eat/drink in the lab was (35.8%) in a survey in Karachi, Pakistan (Nasim *et al.*, 2010). Another Pakistani research done on lab staffs came out with (29.7%) of them do not eat nor drink in laboratory (Nasim *et al.*, 2012). In Gaza strip survey, the finding was (25%) of them do not eat/drink in the lab (Mohammed, 2018), (Ashraf, 2015). Regarding attitude, use of cosmetics 66(34.4%) sometimes, 85(44.3%) always and keep working with torn gloves and broken fingers. This findings was very few to a research done on lab staffs by Zaveri and Karia, they found result as (31.5%) of staff use cosmetics in the Lab (Zaveri, 2012). In

Table 8. The relationship among demographic factors and KAP score of laboratory staffs bio-safety level.

Variables	Age	Designation	EL	YEXP	WHPD	PBMI	BSK	BSA	BSP
Age	1[b]								
Designation	-.159[b*]	1[b]							
EL	-.064[b]	-.289[b**]	1[b]						
YEXP	.754[b**]	-.099[b]	-.057[b]	1[b]					
WHPD	-.023[b]	-.026[b]	-.091[b]	.020[b]	1[b]				
PBMI	.034[b]	-.137[b]	-.014[b]	.001[b]	.024[b]	1[b]			
BSK	.038[b]	-.171[b*]	.195[b**]	.030[b]	.018[b]	.031[b]	1[a]		
BSA	-.078[b]	.191[b**]	.000[b]	-.108[b]	.041[b]	-.109[b]	.044[b]	1[a]	
BSP	-.173[b*]	-.151[a*]	.103[b]	-.039[b]	.023[a]	.066[b]	.023[b]	.041[a]	1[a]

Note: EL=Education Level, YEXP= Year of Experience, WHPD= Working hour per day, PBMI=Participant Body Mass Index, BSK=Biosafety Knowledge, BSA=Biosafety Attitude, BSP=Biosafety Practice, [a] Pearson Linear correlation, [b] Spearman Correlation.

Table 9. Cross tabulation between reports any type of injury and knowledge category.

Characteristic Report any type of injury		Number of respondent's			p-value
		Poor (<50)	Medium (≥50-<75)	Good (≥75)	
No	Count	4	109	15	0.000
	Report injury (%)	3.1	85.2	11.7	
	Knowledge category (%)	100	89.3	22.7	
Yes	Count	0	13	51	
	Report injury (%)	0	20.3	79.7	
	Knowledge category (%)	0	10.7	77.3	

Gaza's study where their result was (25%) of them prohibited to apply cosmetics (Ashraf, 2015). Number of staff had positive attitude to cut their nails in the lab 85(44.3%) sometimes, however 107(55.7%) never cut nail in the lab. This survey was significantly comparable with a survey driven on laboratory staff by Zaveri and Karia, whose response of biting nails in lab was (10%) (Zaveri, 2012). In accordance with the sample, 88 (45.8%) of the respondents answered they had not attended a workshop at their place of employment or enrolled in a course on laboratory safety. When compared to comparable studies that were carried out in the area, this percentage is thought to be lower. For instance, past research from Sudan found that between 60-84.2% of all respondents had any biosafety training (Elduma AH, 2011). A study from Pakistan found results that were comparable to those from Sudan (Nasim *et al.*, 2012). A recent surveyed findings from Yemen, both private and the public lab workers, 67% and 32% had training in laboratory bio-safety (Al-Abhar *et al.*, 2017). The findings showed that several of the prohibited behaviors, such as eating and drinking in the labs, were related to inexperience and a lack of training in lab safety. It is generally known that biosafety training is essential for lowering risk in diagnostic laboratories (Rice *et al.*, 2015; Trim and Elliott, 2003). Staffs with degrees in biology and health sciences typically get assignments that are comparable to those of diagnostic medical laboratory technicians and are therefore exposed to a similar level of danger. Therefore, it is advisable that before receiving the license to conduct a diagnostic laboratory profession, people receive both adequate training and examination. The majority of the staff adhered to safety rules when it came to disposing of medical waste, utilizing sharp objects, cleaning up spilled samples, donning a lab coat, replacing ripped gloves, and disinfecting lab benches, according to the results of a study on employee behavior linked to safety measures. A moderate to low level of adherence to safety precautions was seen in areas including using eye protection, head coverings, and mobile phones while in the lab. Studies from India and Lebanon both demonstrated the same approval to these actions (Goswami and Soni, 2019; Kahhaleh and Jurjus, 2005). The majority of laboratories satisfied the safety requirements with regard to building safety. The majority of laboratories were equipped with working safety cabinets, eye wash stations, sharps disposal containers, biohazard disposal containers, emergency exits, lab safety pamphlets, fire extinguishers, fire blankets, and other safety equipment. This evaluation was based on the responses from the respondents as well as a physical assessment of the locations. Comparatively less standard biosafety compliance with regard to buildings was found in certain other countries, according to research from the past (Kahhaleh and Jurjus, 2005; Nasim *et al*., 2010; Oladeinde *et al*., 2013). Although the majority of the respondents 155(80.7%) reported that they learned about standard safety procedures and occupational health, which contributed to the same outcome in other studies in Ethiopia (Al-Zahrani, 2018; Kassa, 2014) and Nigeria, (Nasim *et al.,* 2010). 11.3% of the laboratories surveyed had a fire extinguisher. This is contradict to 73.9% reported in an previous finding (Mustafa *et al*., 2008). In this study, women's knowledge was superior to men's, result that is in consent with the similar study in Iran (Motamed *et al.*, 2006) but difference result found in a study in Ethiopia (Kassa, 2014). Moreover, a study found greater degree of schooling was also associated with much superior knowledge and practice. Despite the fact that the results of two investigations conducted in Sana'a and Ethiopia do not agree with those of this study (Kassa, 2014; Sherah and Jaafar, 2015). Higher education gave people more opportunities to learn about biosafety. A study conducted in the United Arab Emirates found that laboratory employees with 5 to 10 years of experience had greater understanding, a finding that is consistent with our findings (Sreedharan *et al*., 2011) but dissent result from Sana'a study (Sherah and Jaafar, 2015). This result can be stated by the fact that laboratory employees with greater experience are more likely to get training and are more aware of the value and necessity of biosafety measures. 55.72% of laboratory staff members were observed to be using personal protective equipment in the study. Only 32% (n=123) of Yemeni laboratory employees in a cross-sectional research conducted in 2015 had adequate safety practices (Al-Abhar *et al*., 2017). However, a cross-sectional survey of 230 staff in US army laboratories in Kenya found that 100% of them were wearing PPE, such as gowns, face shields, and goggles (Juma *et al*., 2014). This could be because of the US government's tight control of laboratories regulation. Table 9 represented that good knowledge score staffs reports injury 79.7% to the authority when they victim any types of injury. On the other hand poor and medium knowledge score

staffs less reports when they fall any types of injury. The highest level of awareness (85.7%) and lowest incidence of reported occurrences (14.3%) were found to be among consultants, which is expected of their occupation given that they spend the majority of their time delivering consultations and seldom engage in ordinary manual tasks. In Ghana, similar results were reported (Akagbo *et al.,* 2017). In relation to events In a study conducted in other Saudi Arabian cities, such as Riyadh, where 22% of the workers in pathology labs were subjected to either needle stick or spray of fluids in the face, more than one third of the laboratory staff (36.3%) said that they had been exposed before to events (Driscoll *et al*., 2005). In Al-Madinah, 33% of the hired medical staff from public and commercial institutions considered professional disease, while 24% suffer needle stick injury (Khabour *et al*., 2018). Much higher percentages were seen among health workers in Iranian educational hospitals' labs, where 94 (43.5%) participants reported having experienced a needle stick injury and 70 (36.3%) participants had a spill injury (Mohammad Hossein Ebrahimi *et al*., 2012). Contact with blood or any other potential contaminated materials, wash hands immediately was recorded by (95.8%) of the staffs deliberated as excellent practice, but (4.2%) gives negative response and considered as poor practice. In another study where the finding was (75%) of staffs gives negative response (Shekhar *et al*., 2015). Staffs observed a good practice of wearing PPE when they working the lab were (57.3%), while (42.7%) never observed a good practice of wearing PPE when working in the lab. A study conducted in Malaysia the percentage was (38.5%) and in Pakistan was (19.4%) of lab staffs wear lab PPE (Mohammed, 2018). Given that one out of every three employees runs the chance of suffering an incident while performing lab work, these stated frequencies provide insight into the scope of occupational risks to which lab personnel are subjected. Analyzing the study's findings reveals that laboratory staffs have better biosafety knowledge, attitudes, and practices. The majority of the comments, according to the study, fell into the good to average range. So improvement of feelings towards bio-safety and practices should be focused with especially much more care on respondent. Regular training and awareness campaigns, administrative oversight and surveillance, and checks for compliance with hospital biological waste rules can all help to achieve this. Strict practices with knowledge of biomedical waste management, generation, segregation and appropriate disposal are need of hour to minimize the injuries and health hazard concerned to biological waste.

ACKNOWLEDGEMENT

Authors would like to thank to all laboratories health workers who participated in this study.

Funding Statement

No available fund to this study.

Conflict of interest

None.

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