Assessment of knowledge, Attitude and Practice of Biological Hazards Among Health Workers in Medical Laboratories in Benghazi Medical Center

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To My Parents

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Abstract

Objective: to assess the knowledge, attitude and practices regarding biological hazards among health workers in medical laboratories in Benghazi medical center. **Methods**: A descriptive cross sectional study. **Results**: This study included 86 health workers. Their mean age was 32.6±4.8 years. Male (25.6%) and female (74.4%). Most respondents (76.7%) were aware of the correct way of hand washing. While (74.5%) aware about the importance of changing gloves, and (90.7%) aware about impropriety of re-use of needles and syringes. Most of the respondents (87.2%) were had a positive attitude about the precaution when dealing with infectious diseases, and positive attitude to telling doctor after exposed to needle stick by (80.2%). Around a third (32.6%) of respondents performed good practice to wear mask N95, while (53.5%) of the respondents had good practice of writing a report after needle stick, and (34.9%) of respondents recorded a good practice about wearing goggles when dealing with samples. **Conclusion**: This study showed that a significant number of lab workers had knowledge about biological hazards, most of lab workers had a positive attitude about biological hazards, although some of lab workers were exhibited inadequate practice.

1. Introduction

Every laboratory worker should be aware of the potential hazard in their workplace, it`s important for them to ensure safety in their practice. Personal must be trained in safe working, provided with appropriate protective clothing and subject to agree monitoring procedures to ensure that they are healthy when they start work and remain so during their employment. Due to lack of knowledge of safety precautions, injuries can happen. (Hansa, 2011).

1.1 Biological hazards: refer to organisms or organic matters produced by these organisms that are harmful to human health. These include parasites, viruses, bacteria and fungi. In general, there are three major routes of entry for these microorganisms into our body, i.e. through the respiratory system, transmission through contact with body fluids of the infected or contact with contaminated objects. The harmful effects posed to human health by these biological hazards are mainly of three types - infections, allergy and poisoning. (Martin, 2012).

The fact that laboratory workers, especially those in microbiology, are at greater risk of becoming infected. The factors associated with laboratory-acquired infections include the method of transmission, the development of infection in the host, the route and source of infection, and the laboratory environment (e.g., ventilation, equipment, and procedures). Early investigators recognized that some microorganisms (e.g., *Brucella* spp. and *M. tuberculosis*) cause more infections than others (e.g., *E. coli*) and that some equipment, procedures, and tasks are associated with a higher incidence of infections in laboratory workers; they therefore explored measures to prevent infections associated with specific organisms and tasks. (David, 1995).

1.2 Specific laboratory-acquired infections

1.2.1 Bacteria

Bacteria account for the largest proportion of infections (43%) in diagnostic laboratories, with a different species reported. (Pike, 1976).

1.2.1.1 Neisseria meningitides*:* the risk of laboratory-acquired N. meningitides infection using postings on listservs, to obtain reports of laboratory-acquired meningococcal disease occurring worldwide during the period 1985– 2001. Sixteen cases

of probable laboratory-acquired meningococcal disease were identified. All cases occurred among clinical microbiologists and were likely due to exposure to aerosols containing *N. meningitides.* Laboratory-acquired meningococcal disease represents a significant occupational hazard to clinical microbiologists. Although primary prevention of laboratory-acquired meningococcal disease should focus on appropriate handling and manipulation of cultures in a laminar flow (biological safety cabinet BSC), all laboratory microbiologists should be offered the tetravalent vaccine, It will decrease but not eliminate the risk of infection. (CDC, 2002).

1.2.1.2 Mycobacterium tuberculosis*:* early surveys of laboratory-acquired tuberculosis found an incidence of tuberculosis among laboratory personnel 3–9 times greater than that in the general population. (Harrington, 1976).

However, it is difficult to state with certainty that tuberculosis was laboratory acquired, because of the potential for exposure outside of the workplace and the long incubation period before symptomatic disease develops. *M. tuberculosis* can be isolated from a variety of clinical specimens, and manipulation of specimens or cultures that generate aerosols is the most important risk factor for acquiring tuberculosis in the laboratory. (CDC, 1999).

The use of laminar flow BSC for aerosol- generating manipulations with class II laminar flow cabinets and fit-tested respirators with N-95 rating should be routinely used. (Kimman, 2008).

1.2.1.3 Meticillin-resistant Staphylococcus aureus (MRSA): strains are prevalent bacterial pathogens that cause both health care and community-associated infections. Increasing resistance to commonly prescribed antibiotics has made MRSA a serious threat to public health throughout the world. (Richard, 2012).

1.2.1.4 Enteric pathogens: salmonellosis is one of the most common reported infections in published surveys. In recent surveys, *Shigella* species was the most frequently identified agent of laboratory-acquired infection. One explanation for the large number of reported cases of laboratory- acquired shigellosis is that *Shigella* species are more virulent and require a much lower inoculum to cause illness. However, it is also probably true that microbiology laboratory staff who develop diarrhea are more likely to attempt to establish a cause for their illness, compared with the general population. A number of other enteric

pathogens have also been identified as less common causes of laboratory-acquired infection, including *Clostridium difficile* and *Escherichia coli*. (Grist, 1991).

1.2.2 Viruses

Viral agents transmitted through blood and bodily fluids cause large portion of the laboratory-acquired infections in diagnostic laboratories and among health care workers. (David, 1995).

1.2.2.1 Human immunodeficiency virus (HIV)

Human immunodeficiency virus infection associated with exposure to contaminated blood or body fluids probably causes the greatest concern. The risk of HIV transmission after a percutaneous exposure to HIV-infected blood has been estimated to be 0.3%, and the risk has been estimated to be 0.09% after exposure to a mucous membrane. (David, 1997).

1.2.2.2 Hepatitis

One hazard for health care workers HCWs is needle sticks, and from this comes the risk of hepatitis, although transmission has occurred through other routes. Hepatitis can be transmitted through various routes, including oral–fecal hepatitis A (HAV), sexual (hepatitis B (HBV), and blood-borne (hepatitis B and C). Currently, there is a vaccination for hepatitis B but not C. As a general rule, these viruses can survive in the environment for a few hours to a day or so.

Vaccination for HBV consists of a three-injection series that induce serocon version in 95% of children and 90% of adults. For those not responding, revaccination will result in 30%–50% of this population seroconverting. Administration of this vaccine is through intramuscular injection with the second and third administered 1–6 months after the first. Ideally, injections should be about a month apart. There are various groups at risk to these viruses in a health-care setting.

For hepatitis B and C, the risks for HCWs are mostly related to needle sticks, especially hollow-bore needles. This commonly occurs during recapping of needles. It has also been suggested that blood-borne exposures. For blood-borne injuries, 51% were from needle sticks, 16% from sutures needles, 13% from sharp objects, and 19.5% resulted from skin contamination.

Overall, hepatitis C is not considered to be effectively transmitted by needle stick in comparison with hepatitis B. However, with the increased rate of vaccination against the hepatitis B virus. (William, 2012).

1.2.3 Parasites and fungi

1.2.3.1 Parasites

Laboratory-acquired parasitic infections are uncommon in the diagnostic microbiology laboratory. One case of giardiasis was reported in a clinical laboratory technologist who processed specimens, many of which were in leaky containers. One case of *Isospora belli* infection occurred in a technologist who examined numerous stool specimens from a patient infected with *I. belli*. (Herwaldt, 2001).

1.2.3.2 Fungi

The dimorphic fungi *Blastomyces dermatitidis, Coccidioides immitis,* and *Histoplasma caspsulatum* are responsible for the majority of laboratory-acquired fungal infections in the United States. Although cutaneous infections due to accidental inoculation were documented, most laboratory-acquired infections are caused by inhalation of infectious conidia from the mold form, resulting in pulmonary infection. The mere lifting of a culture plate lid often suffices to cause the release of large numbers of conidia, and should a sporulating culture be dropped, millions of conidia would be dispersed. The risk of infection in the mycology laboratory probably is low, because handling of specimens is done in laminar flow BSC. (David, 1995).

Table 1.1: Risk of laboratory-acquired infections for microbiologists vs. the general population, same relative age. (Ellen, 2008).

Organism	Risk/100 000 microbiologists	Risk/100 000 general population
Brucella	641	0.08
Coccidioides	13.7	12
C. difficile	0.2	8
E. coli	8.3	0.96
N. meningitides	25.3	0.62
Salmonella	1.5	17.9
Shigella	6.6	6.6

1.3 Transmission routes of laboratory-acquired infections

Transmission routes involved in laboratory-acquired infections, (87 %) of the cases were airborne infections, while the others were percutaneous infections (via a penetrating sharps injury). In none of the laboratory-acquired infections was the infection transmitted to another person. Half of the cases were related to technical failures in equipment and infrastructure. However, these cases occurred in a single laboratory where the environment was not safe. (Wurtz, 2016).

1.4 Preventive strategies for laboratory -acquired infection

1.4.1 Isolation at the source of infection

Isolation of infection is defined as the use of all measures that prevent the direct and indirect transmission of an infectious agent from the source.

Decontamination of the human and/or inanimate source, decontamination aims to remove or to kill the infectious agents in the source and/or within the mode of transmission.

1.4.2 Methods of decontamination

1.4.2.1 Cleaning: cleaning removes the microbes by physical (mechanical or dissolving) and/or chemical (detergent) methods. (Zsolt, 2003).

1.4.2.2 Disinfection: means to eliminate most harmful microorganisms (not including their spores) from surfaces or objects.

1.4.2.3 Sterilization: means to kill all microbes - whether harmful or not - and their spores present on a surface or object. (Kramer, 2016).

1.4.2.4 Disposable equipment and reusable

Disposable equipment is produced for single use and is often made of plastic, which can be damaged by frequent cleaning and disinfection.

Disinfection and cleaning of reusable equipment should be done in a separate room set aside specially for the purpose, thereby avoiding unnecessary contamination of the environment, particularly of clean and sterile equipment. (Zsolt, 2003).

1.5 Engineering controls

The preferred preventive measure for prolonged or highly hazardous potential exposures is the use of engineering controls. Workplace controls are intended to contain biohazards at their source, reduce their airborne concentration, and limit their movement

through the work site. Heating, ventilation and air-conditioning (HVAC) systems, must also be appropriately designed and maintained to prevent contamination by fungi and bacteria.

For indoor settings, such as medical or research facilities, room ventilation can be engineered to provide directional and single pass airflow. In hospitals, air exhausted from high-risk infectious disease isolation rooms can be further decontaminated by filtration.

In research and clinical laboratories, handling infectious agents in a biological safety cabinet (BSC) can prevent inhalation exposures. For bio aerosol control, the correct type of unit must be used.

1.5.1 Class I cabinets: provide personnel protection but little or no product protection. Room air flows into this open cabinet and is ducted through a high-efficiency particulate air (HEPA) filter. This filtration system traps all microorganisms, including viruses, with 99.97% efficiency at the 0.3 micron particle size and essentially 100% capture of particles larger than 0.3 microns.

1.5.2 Class II laminar flow cabinets: are the most commonly used laboratory containment devices. An air barrier at the front opening of the cabinet provides personnel protection.

The air circulating in the workspace is HEPA filtered, providing protection from contamination for the biological material inside the cabinet. The exhaust is also passed through a HEPA filter and either returned to the room or ducted outside.

1.5.3 Class III cabinets: are totally enclosed gastight ventilated chambers. They are used in laboratories for work with organisms that are highly infectious through the airborne route.

Other engineering controls include special containers for waste and sharps disposal, needleless systems, and devices such as self-resheathing needles. (Peter, 2002).

1.6 Administrative controls

Administrative control focuses on maintaining good work habits to minimize exposures due to spills, accidental releases, or other causes.

Hands should be washed frequently, work surfaces should be decontaminated properly, and under no circumstances should food, beverages or tobacco products be stored

or consumed in the same work area as bio hazardous agents. Access to biohazard work areas should be restricted to employees who have had appropriate safety training and who have the necessary personal protective equipment. In laboratories, mouth pipetting should be prohibited. (Peter, 2002).

1.7 Universal precautions

Laboratory workers should familiarize themselves with "universal work precautions," as defined by Center for Disease Control, are a set of precautions designed to prevent transmission of Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other blood borne infections when pro-viding first aid or health care. Under universal work precautions, blood and certain body fluids of all patients are considered potentially infectious for HIV, HBV and other blood borne pathogens. (Izegbu, 2005).

Universal work precautions apply to blood, other body fluids containing visible blood, semen, and vaginal secretions. Universal work precautions also apply to tissues and to the following fluids: cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids. Universal work precautions do not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomitus unless they contain visible blood. Universal work precautions do not apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable. (Deshpande, 2013).

Universal work precautions involve the use of protective barriers such as gloves, gowns, aprons, masks, or protective eyewear, which can reduce the risk of the health care worker's skin or mucous membranes to potentially infective materials. In addition, it is recommended that all health care workers take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices. Laboratory technicians are exposed to a large pool of specimens from patients suffering from infections such as HBV and HIV. (Falope, 1998).

However, they seem to have a poor perception of the risk of infections and are not compliant with the basic principles of universal work precautions. (Brusaferro, 1997). This system of infection control is, therefore, very important if the risk of transmission of infections in the laboratory is to be minimized, as they may not be aware of the outcome of blood and fluid specimens until they are investigated or contaminated instruments in the laboratory. (Teka, 2015).

1.8 Hand hygiene

It has long been known that hand hygiene among health care workers plays a central role in preventing the transmission of infectious agents. Hand-washing is the most effective way of preventing the spread of infectious diseases.

The reasons of lack of compliance to hand washing include: lack of appropriate equipment, low staff to work ratios, allergies to hand washing products, insufficient knowledge among staff about risks and procedures, the time required and casual attitudes among staff towards biosafety. (William, 2012).

Hand hygiene technique is seldom incorporated into research studies and audits designed to increase compliance.

In order to be effective, efforts to improve compliance with hand washing guidelines must be multifaceted and should include increasing the availability and accessibility of hand washing sinks and alcohol-based hand rubs. (Abd Elaziz, 2008).

1.9 Biomedical waste

Health care services produce biomedical waste (BMW), which is defined as waste generated during diagnosis, treatment or immunization of human beings. There is a need for the health care workers to understand what actually BMW is, and the waste connected with the hospital.

Among all health problems, there is a particular concern with HIV/AIDS, hepatitis B and C, for which there is a strong evidence of transmission through healthcare waste. BMW collection and proper disposal has become a significant concern for both the medical and general community. Proper healthcare waste management includes five steps, namely segregation of biomedical waste at the point of generation, treatment, storage, transportation and final disposals.

Health personnel who are involved in handling BMW at different point of generation in hospital include doctors, nurses, lab technicians etc. Though, there is an increased global awareness among health professionals about hazards and appropriate management techniques, but gaps in knowledge and lacunae in attitudes and practices are still prevalent to a worrying extent among various categories of healthcare professionals. (Nabarun, 2016).

The proper waste management of biological waste is an important infection control measure in all work settings. In medical facilities and laboratories, wastes that are potentially infectious must be initially segregated from other wastes and placed in identifiable biohazard storage bags, affixed with the international biohazard symbol. All sharps must be placed in hard-walled, leak proof and secure containers.

Contaminated needles should not be cut or recapped prior to disposal.

Decontamination can be accomplished by means of sterilization, disinfection, sanitization, or antisepsis. (Peter, 2002).

1.10 Personal protective equipment (PPE)

The use of personal protective equipment (PPE) is indicated whenever the hazards cannot be eliminated through the use of facility design and other engineering controls. Gloves should always be worn when handling infectious agents or secretion samples from potentially infectious patients.

Eye protection is important when working with certain airborne biological hazards. Instead of ordinary safety glasses, goggles or face shields should be employed when potentially infectious particulates may arise.

Masks protect the workers from exposure to airborne organisms. The worker breathes unfiltered air that enters the airway from around the sides of the mask. To protect the worker from biological hazards in the environment, one of many varieties of certified respirators must be used, such as surgical masks, N95 or higher-level respirators. (China united center, 2003).

Protective clothing includes protective overall (with attached hood), lab coat, gown, apron, head and shoe covers.

Protective clothing should be waterproof or impervious to liquids to protect the body from contamination by blood, droplets or other body fluids and prevent these contaminants from getting into the body through open wounds or contaminating the worker's own clothing, thus reducing the chance of spreading of pathogen and cross-infection. (Peter, 2002).

1.11 Problem statement

Malpractice due to the lack of awareness and knowledge of biological hazards in medical laboratories could cause a significant increase in laboratory accidents rate.

In addition, the lack of information that high light the importunacy of knowledge, attitude and practice of biological hazards is also plays a major role in increase in ignorance.

Never the less, the biological hazards in laboratories can pose a significant risk to health workers and community if not properly controlled.

1.12 Study justification

There are numerous studies worldwide that have studied knowledge, attitude and practice of biological hazards among health workers in medical laboratories, unfortunately are not easily reachable.

The results of this study will be contributed for a deeper understanding of the safety challenges dealing with biological hazards in medical laboratories in Benghazi in order to improve health workers' knowledge, attitude and practice, and make study-based recommendations that can be used by Ministry of Health in relative matters.

1.13 Definition of variables

1.13.1 Health worker: It is a position located in the hospital laboratory which concern the testing, evaluating and diagnosing.

1.13.2 Knowledge: The level of awareness which can be translated as the Information and the understanding of biological hazards that faces the Health care workers in medical laboratories.

1.13.3 Attitude: It is a set of reactions that could refer at as behaviors that varies to different hazards effects.

1.13.4 Practice: It is the amount of experience and skills that has been gained throw out facing different biological hazards.

1.14 Aim of study:

This study aimed to assess the knowledge, attitude and practices regarding biological hazards among health workers in medical laboratories in Benghazi medical center.

1.15 Objectives of the study

1. To assess level of knowledge about biological hazards among health workers in medical laboratories.
2. To evaluate attitude about biological hazards.
3. To assess health worker's practice about biological hazards in medical laboratories.
4. To find out the main factor that effects their knowledge i.e. age, education and sex.

1.16 Literature Review

Puneet A. and collaborators conducted a Observational, descriptive cross sectional study in India was published in (2016). The study was to understand the level of awareness regarding biomedical waste handling. The results were: lab technicians had good knowledge, attitude and practice regarding biomedical waste management. (Puneet, 2016).

Mohamed D. and co-authors in (2016) conducted a descriptive cross sectional hospital based study in Sudan among Health care workers at soba university hospital. To measure knowledge, attitude and practices on needle stick injuries, their results were: more than 90% knew that HIV, HBV, and HIV could be transmitted through needle stick injuries. 18.0% of participants did not complete the hepatitis B virus vaccination. (Mohamed, 2016).

Mercy O. and Birch D. conducted a descriptive, cross-sectional study in Nigeria was published in (2016). The study was aimed at assessing the level of knowledge, attitude and practice of dental surgeons on human immunodeficiency virus (HIV) and hepatitis B virus (HBV) post-exposure prophylaxis (PEP), their results were: A high proportion of the respondents, 47 (87.0%), had been vaccinated against HBV. (Mercy, 2016).

Agu P. and co-workers in (2015) conducted a cross sectional descriptive study, was carried out using a multistage sampling technique in Nigeria on rural primary health care workers at Enugu State. The study therefore, assessed the level of knowledge, attitude and practice of universal precaution, their results were: 18% had adequate knowledge, 88.3% had a positive attitude, while 19.7% exhibited optimum practice. (Agu, 2015).

Ashraf E. in (2015) performed a cross sectional descriptive study in Gaza Strip. Was aimed to describe the prevalence of exposure to occupational hazards among nursing students and to determine the degree to which occupational safety and health control strategies are applied. The results showed that Needle stick injuries when using sharp devices were reported by (45.5%) of the respondents. Although most of the respondents (97.4%) were fully aware of using Personal Protective Equipment and safety regulations. (Ashraf, 2015).

Himanshu S. and his team conducted a cross-sectional study in India was published in (2015). The aim of this study was to find out the level of awareness and biosafety measures taken by laboratory technicians during their routine work in a tertiary-care center,

their results were: (33.3%) were found aware of universal work precaution, (75%) were found immunized with hepatitis B vaccine, and (75%) were found to leave the laboratory without following proper hand wash rule after finishing duty. (Himanshu, 2015).

Malini A and Bala E. conducted an observational descriptive hospital based cross sectional study in India was published in (2015). This study aimed to assess Knowledge, Attitude and Practice of Biomedical waste management among health care personnel in a tertiary care hospital. Results showed that there was poor knowledge regarding disposal of sharps among technicians. It also (26%) of the laboratory technicians have undergone training in BMW management. They had good knowledge regarding the diseases transmitted through improper bio medical waste handling. (Malini, 2015).

Milind K. and collaborators in (2014) conducted a descriptive co relational design study in India to assess the knowledge and Practices of Universal Precautions among Nursing Students and Find out association between Universal Precautions and students. Findings - majority (66%) of the student nurses had an average, majority (66%) of the student nurses had an average knowledge whereas (20%) students showed a satisfactory performance of universal precautions. (Milind, 2014).

A cross-sectional survey was conducted in Lebanon on Healthcare workers working in 4 general hospitals in South Lebanon. By Ibtissam S. and collaborators, published in (2013). Their study describe the prevalence and the risk factors for occupational exposure to blood and body fluids among Healthcare workers and evaluate knowledge, attitude, and practices of HCW concerning blood borne pathogens and adherence to universal safety precautions. They found (43.3%) of HCWs expressed that they use gloves all the time for every activity of care. (67.1%) were aware that needles should not be recapped after use. Percutaneous injuries were the most frequently reported. Vaccination coverage was (88.4%) for hepatitis B. (Ibtissam, 2013).

Nagaraju B. and co-authors in (2013) performed a quantitative descriptive survey in India to assess the knowledge and practice of bio-medical waste management among the health care providers working in primary health centers (PHCs) of Bagepalli Taluk with the view to prepare informational booklet. Results showed that (17%) had attended in-service education regarding biomedical waste management. Knowledge of subjects regarding bio-medical waste management was (65%) had average knowledge and (24%) had good

knowledge. Practice of subjects regarding bio medical waste management was (53%) had average practice and (35%) had good practice. (Nagaraju, 2013).

A cross-sectional study was conducted in Malaysia by Olumide A. in (2013) was aimed to investigating knowledge, awareness and compliance of student researchers to laboratory safety procedures. Results showed that (62%) are aware and have the knowledge of laboratory safety practices. However, (80%) of respondents are compliant to these procedures. All respondents wash their hands after working in the lab. (61.5%) often disinfect their workbenches before and after working. (38.5%) always wear their lab coat and (69.2%) wash their lab coat every month. (Olumide,2013).

Sadia N. and co-authors were conducted a quantitative and qualitative mixed, cross-sectional survey in Pakistan was published in (2012) was aimed to determine biosafety perception and practices of laboratory technicians during routine work in clinical laboratories of Pakistan. Results showed that (30.7%) of the respondents said they discard used syringes directly into municipal dustbins. The majority (66.7%) claimed there are no separate bins for sharps, so they throw these in municipal dustbins. Mouth pipetting was reported by (28.3%) technicians. Standard operating procedures were not available in (67.2%) labs, and accident records were not maintained in (83.4%). (Sadia, 2012).

Jitendra Z. and Jigna K were conducted a cross-sectional study in India published in (2012). Objective of the study is to determine the knowledge, attitude, and practice of universal work precautions amongst medical laboratory technicians. The results were: All the respondents wear gloves during laboratory work. (45.6%) of the respondents eat in the laboratory, (47.0%) of them store foods and water in the refrigerators, (31.5%) of them put on cosmetics in the laboratory, (12.6%) smoke in the laboratory, (10.0%) cut their finger nails with teeth in the laboratory. (91.5%) were not immunized against hepatitis B virus (HBV). (99.0%) of them do not take shower immediately after laboratory work. (82.0%) of the respondents do not feel that the use of masks is necessary in laboratory. (Jitendra, 2012).

Emmanuel C. and co-authors publish in (2012) a prospective study in Nigeria. This study aimed to assess the level of awareness of HBV and hepatitis C virus (HCV), HBV vaccination and adoption of safety measures by theatre and laboratory workers. The results were: (94%) were aware that HBV and HCV are viral infections, while (77%) knew HBV

and HCV were transmitted through blood transfusion and needle stick injuries. Only (67.5%) use safety measures consistently, while (54.8%) had received the vaccine and only (29.78%) of respondents had completed three (3) doses. (Emmanuel, 2012).

Sadia N. and co-authors were conducted a quantitative, cross-section survey was published in (2010). The aim of this study was to find out the level of awareness and biosafety measures taken by hospital based laboratory technicians during their routine work in clinical laboratories in Karachi, Pakistan. Results showed that (46.2%) of the laboratory technicians did not use any kind of personal protective equipment, and almost (39.5%) of the respondents recapped used syringes. Only about (36%) of the respondents discarding used syringes directly into municipal dustbins. In addition, about (65.2%) of the respondents declare that there is no separate discarder for sharps so they throw these too into municipal dustbins. Although mouth pipetting was considered obsolete, (38%) of the technicians continue to do so for various purposes. Additionally, standard operating procedures were not available in (73.9%) of the labs, and accident records were not maintained in (83.4%). (Sadia, 2010).

Haoses G. and co-authors had conducted a quantitative exploratory descriptive design was used in Namibia to determine the extent of the knowledge on occupational hazards amongst registered nurses in the Onandjokwe Health District in (2005). The results indicated that a significant number of registered nurses have knowledge on occupational hazards, although there are a few numbers which have insufficient knowledge on occupational hazards. Registered nurses also try to practice occupational safety but the restrictions such as non-availability of facilities prevent them from the safety practices. The study also revealed that information on occupational hazards/safety and support is provided to some nurses but not to all of them. There are only some guidelines/strategies in place for occupational hazards/safety although not all the nurses are aware about them. (Haoses, 2005).

Gurubacharya D. and co-authors were conducted a survey in Nepali was published in (2003). This study aimed to assess the knowledge, attitude and practices among health care workers on needle stick injuries. Results showed that (4%) and (61%) of health care workers, respectively, were unaware of the fact that hepatitis B and hepatitis C can be transmitted by needle-stick injuries. (74%) had a history of needle-stick injuries and only

21% reported the injuries to the hospital authority. Only (23%) were in the habit of using gloves for all the time. (79%) were of the impression that needle should be recapped after use. Only (66%) were aware of Universal Precaution Guidelines. (60%) had been vaccinated against hepatitis B. Only (14%) had been tested for Anti-HBs antibody after hepatitis B vaccination. (Gurubacharya, 2003).

A cross sectional study in Saudi done by Maqbool was published in (2002) to assess the knowledge, attitude and practices among health care workers on needle-stick injuries. Results showed that (84%) had been vaccinated against hepatitis B, only 6 (10%) had been tested for anti-HBs antibodies after hepatitis B vaccination to check their response. (21%) and (30%) of the health care workers, respectively, were unaware of the fact that AIDS and hepatitis C can be transmitted by needle stick injury. Only (7%) of respondents reported the injuries to doctors, and only (27%) of were in the habit of using gloves regularly. (29%) were of the impression that needles should be recapped after use, and only (61%) were aware of universal precaution guidelines. (Maqbool, 2002).

2. Methodology

2.1 Study design:

Descriptive cross sectional study, carried out on all Health workers in medical laboratories of Benghazi medical center in all shifts.

2.2 Period of data collection:

Data collection was carried out from 14th April to May 7th of the year 2016.

2.3 Sample size and selection:

The all target population was (93) who present at time and date of data collection in medical laboratories of Benghazi medical center.

2.4 Response rate: About 93questionnaire were distributed, but 86 questionnaires were completely filled, response rate was (92.4%).

2.5 Inclusion criteria: All Health workers in medical laboratories of Benghazi medical center, both sex, and in the three shifts.

2.6 Exclusions criteria: Not present at time of the study or refuse to participate.

2.7 Data Collection: Questionnaire for assessment of knowledge, attitude and practice of biological hazards among health workers in medical laboratories in Benghazi medical center conducted by researcher, The questionnaire was designed after the literature review, and it was done in order to meet the purpose and objectives of the study. Questions were formulated in simple words. (Appendix I)

2.8 Questionnaire Parts

The questionnaire consists of four parts:

2.8.1 Part I:

Information about personal demographic data as age, sex, education and duration of work.

2.8.2 Part II:

Assessment of Health Workers knowledge about Biological Hazards.

2.8.3 Part III

Assessment of Health Workers Attitude about Biological Hazards.

2.8.4 Part IV:

Assessment of Health Workers Practice about Biological Hazards.

2.9 Data Analysis:

Data analyzed by using (SPSS) statistical package of social science program version 18.

2.9.1 Descriptive statistics: as mean, standard, deviation and median had been used. Data presented in form of tables and figures, were the figures done by Microsoft Excel 2010.

2.9.2 Inferential statistics: were used Chi-square (χ^2) to find the difference in the distribution of the variables between two groups, P-value were considered significant when ≤ 0.05.

2.10 Pilot study: The questioner was tested by six workers and some questions was changed.

2.11 Ethical consideration: Permission to conduct the study was approved by hospital mangers, also was taken from all respondent before answering the questionnaires.

3. Results

3.1 Demographic distribution

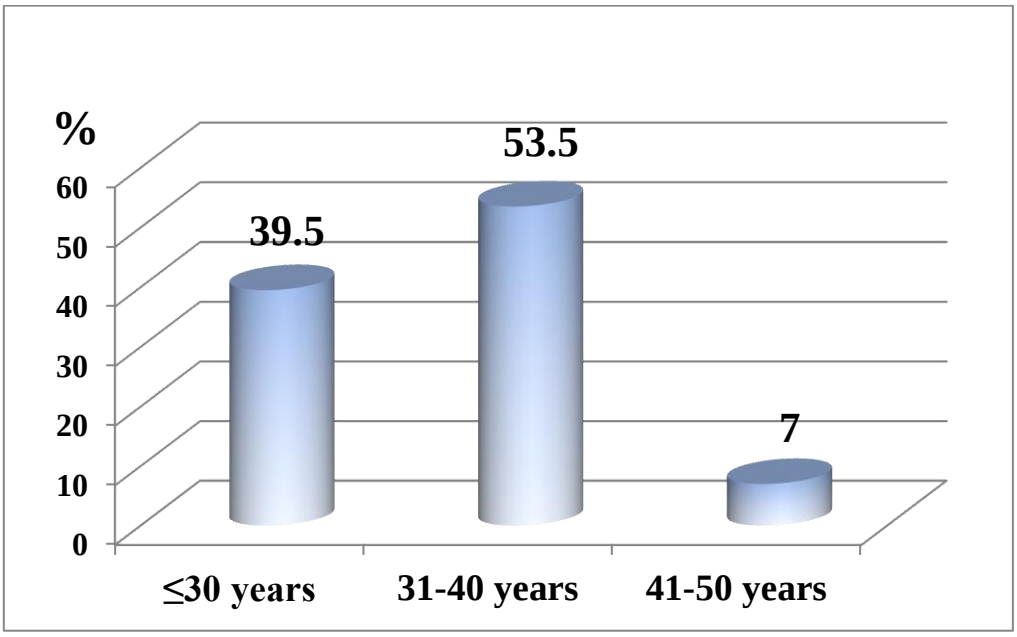

Fig.3.1.1 Distribution of the sample according to age.

Mean = 32.6years. Stad. Deviation = ±4.8 years. Median = 30years . Minimum age = 23 years. Maximum age = 47 years.

Distribution of respondents according to sex are illustrated in figure 3.1.2. These findings show that 74.4% of respondents were female and 25.6% were male.

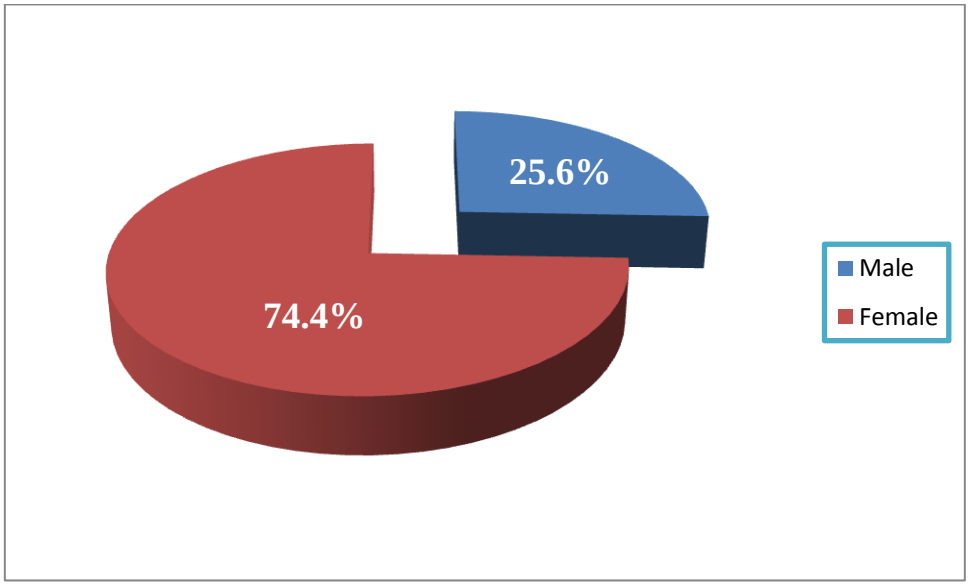

Fig.3.1.2 Distribution of the sample according to sex.

Distribution of respondents according to level of education showed in figure 3.1.3. These findings showed that, most of respondents had University level education.

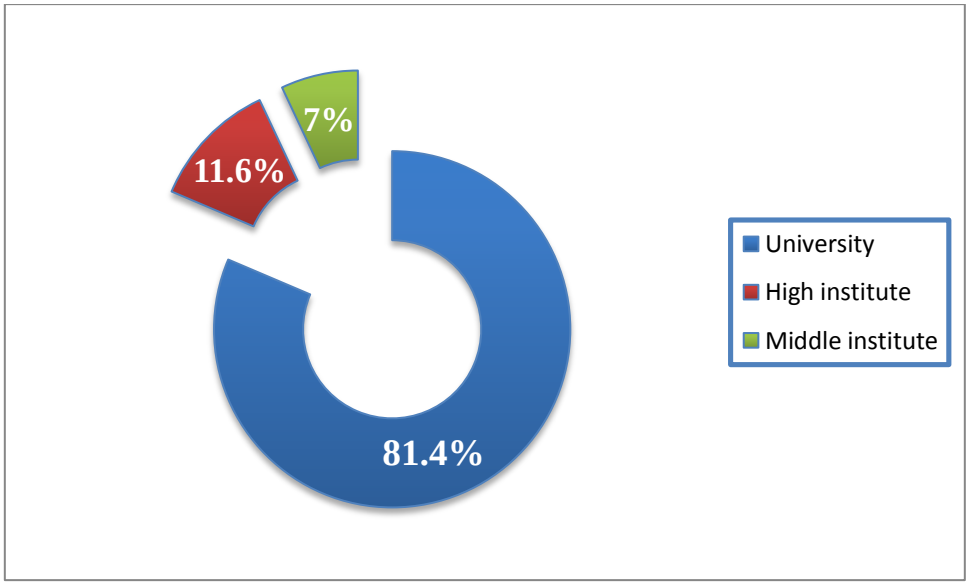

Fig.3.1.3 Distribution of the sample according to level of education.

Distribution of respondents according to duration of work showed in figure 3.1.4. These findings showed that most of them had a work experience less than 10 years.

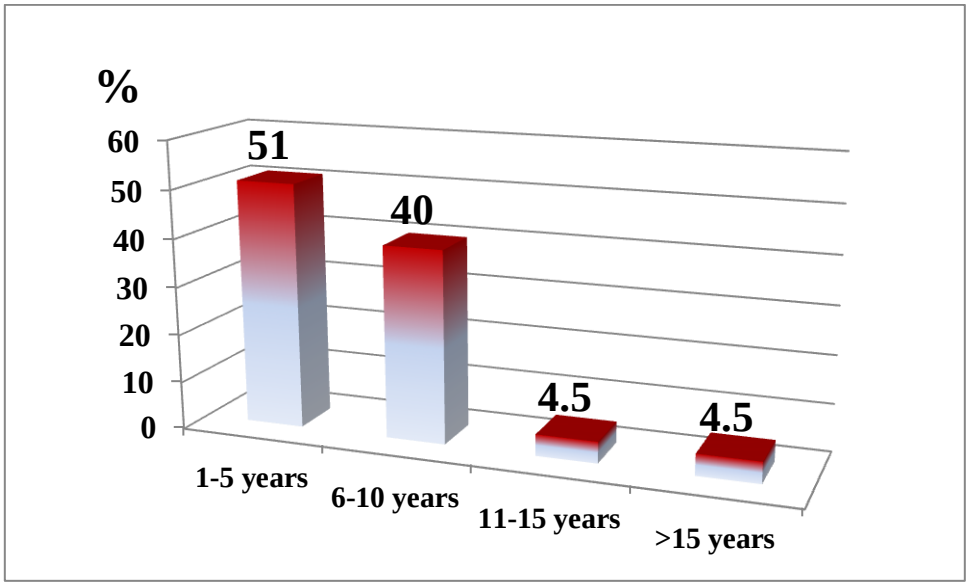

Fig.3.1.4 Distribution of sample according to duration of work.

Mean= 5.96 years. Stad. deviation= ±4.42 years Median=5 years. Minimum=1 year. Maximum=23 years.

3.2 Knowledge

Table 3.2.1 Distribution of worker's knowledge about the right way of hand washing.

Hand washing	No.	%
Water and Soap	20	23.3
Water, Soap and disinfectant	66	76.7
Total	86	100

In table 3.2.1 most respondents (76.7%) said that washing of hand by water, soap and disinfectant is most appropriate way for hand washing.

Table 3.2.2 Distribution of worker's knowledge about frequencyof changing gloves.

Gloves changing/day	No.	%
Once	15	17.4
If disruption	7	8.1
After each test	64	74.5
Total	86	100

Table 3.2.2: Shows the majority of respondents aware about the importance of changing gloves after each test by (74.5%).

Table 3.2.3 Distribution of worker's knowledge about importance of wearing face mask.

Wearing face masks	No.	%
Yes	52	60.5
No	34	39.5
Total	86	100

Table 3.2.3: Shows more than a half (60.5%) of respondents know the importance of wearing face mask.

Table 3.2.4 Distribution of worker's knowledge about the re-use of needles and syringes.

Re-use of needles and syringes	No.	%
Yes	8	9.3
No	78	90.7
Total	86	100

Table 3.2.4: Shows that high frequency of respondents in the study (90.7%) aware about impropriety of re-use of needles and syringes.

Table 3.2.5 Distribution of worker's knowledge about transmission of germs by needlestick.

Needlestick transmitted germs	No.	%
Yes	81	94.2
No	5	5.8
Total	86	100

Table 3.2.4: Shows a high percent of respondents had knowledge about transmission of germs by needlestick.

Table 3.2.6 Distribution of worker's knowledge about mode of transmission of hepatitis B, hepatitis C and HIV.

	By blood		By contact		Body fluid		Total	
	No.	%	No.	%	No.	%	No.	%
HBV	36	41.9	3	3.5	47	54.6	86	100
HCV	49	57	8	9.3	29	33.7	86	100
HIV	45	52.3	4	4.7	37	43	86	100

Table 3.2.6: Shows the percentage of respondents knowledge about the mode of transmission of hepatitis B virus was (54.6%), hepatitis C virus was (57%) and HIV virus was (43%).

Table 3.2.7 Distribution of worker's knowledge about vaccination against hepatitis B viarus.

Vaccine against HBV	No.	%
Prevent infection	28	32.6
Infection become less	58	67.4
Total	86	100

Table 3.2.7: Shows the percentage of (67.4%) from respondents had a correct knowledge about vaccination against hepatitis B virus.

Table 3.2.8 Distribution of worker's knowledge about dealing with *Mycobacterium tuberculosis.*

Dealing with TB bacteria	No.	%
Any cabinet	7	8.1
Special cabinet	23	26.8
Special lab	56	65.1
Total	86	100

Table 3.2.8: Shows the knowledge of respondents about dealing with Mycobacterium Tuberculosis need a special laboratory by percentage of (65.1%).

Table 3.2.9 Distribution of worker's knowledge aboutmedical waste separation.

Waste separation	No.	%
All in same container	32	37.2
Sharp and non-sharp	54	62.8
Total	86	100

Table 3.2.9: Shows the knowledge of respondents about separation of the medical waste into sharp and non-sharp by (62.8%).

3.3 Attitude

Table 3.3.1 Distribution of worker's attitude in the laboratory.

Attitude to biological hazard	Yes		No		Total	
	No.	%	No.	%	No.	%
Taking the precaution when dealing with infectious diseases.	75	87.2	11	12.8	86	100
Telling doctor after exposed to needle stick.	69	80.2	17	19.8	86	100
Carry on work when injured.	16	18.6	70	81.4	86	100
Make mistakes while performing work.	69	80.3	17	19.7	86	100
Eating inside lab.	24	27.9	62	72.1	86	100
Smoke cigarettes inside lab.	7	8.1	79	91.9	86	100
apply cosmetics in the lab.	20	23.2	66	76.8	86	100
Bite their nails inside lab.	7	8.1	79	91.9	86	100
Wearing gloves with jewelry.	36	41.9	50	58.1	86	100
Take coat to home with them.	51	59.3	35	40.7	86	100
Using lab refrigerator to store food and beverage.	15	17.4	71	82.6	86	100
Taking shower immediately after left lab.	11	12.8	75	87.2	86	100

Table 3.3.1: Showed that the most of lab workers had a positive attitude to word the biological hazards except for taking shower immediately after left laboratory.

Table 3.3.2 Distribution of worker's attitude according to use pipette by mouth and duration of work.

Using Pipette by mouth.	Duration of work				Total	
	≤5 years		>5 years			
	No.	%	No.	%	No.	%
Yes	13	28.9	4	9.8	17	19.8
No	32	71.1	37	90.2	69	80.2
Total	45	100	41	100	86	100

$\chi^2 = 3.819$ df = 1 P = 0.05 (significant)

Table 3.3.2: Shows that the experienced workers more than fife years had a positive attitude about technic of using Pipette by mouth.

Table 3.3.3 Distribution of worker's attitude according to place of test conduction and education.

Tests were conducted away from the cabinet.	Education				Total	
	Below University		University			
	No.	%	No.	%	No.	%
Yes	2	12.5	36	51.4	38	44.2
No	14	87.5	34	48.6	48	55.8
Total	16	100	70	100	86	100

$\chi^2 = 6.502$ df = 1 P = 0.011 (significant)

Table 3.3.3: Shows that the respondents of below University level had a good attitude about conducting lab tests away from the cabinet.

3.4 Practice

Table 3.4.1 Distribution of worker's practice in the laboratory.

Practice tobiological hazard	Yes		No		Total	
	No.	%	No.	%	No.	%
Washing hands immediately after complete work	81	94.2	5	5.8	86	100
Closing of pipes before placing it in the centrifuge.	85	98.8	1	1.2	86	100
Disinfecting all contaminated instruments.	74	86	12	14	86	100
Recap the needle after use.	64	74.4	22	25.6	86	100
Wear mask N95.	28	32.6	58	67.4	86	100
Write a report after needlestick.	46	53.5	40	46.5	86	100
Ues of standard operating procedures.	37	43	49	57	86	100
Test the effectiveness of vaccinations against HBV.	22	25.6	64	74.4	86	100
Examining themself from some infectious diseases.	51	59.3	35	40.7	86	100
Development of themself to avoid mistakes.	81	94.2	5	5.8	86	100
Complete of vaccination against hepatitis B.	41	47.7	45	52.3	86	100
Wearing gloves when enter lab	19	22.1	67	77.9	86	100
Wearing coat when enter lab	71	82.6	15	17.4	86	100
Washing of coat with other clothes.	10	11.6	76	88.4	86	100
Wearing a goggles when dealing with sample.	30	34.9	56	65.1	86	100
Disinfection the cabinet after each test.	33	38.3	53	61.7	86	100
Sterilizing instruments after handlingPetri dishes.	71	82.6	15	17.4	86	100

Table 3.4.1: Showed that percent of (94.2%) from respondents washing hands immediately after complete work. Percent (98.8%) of respondents closing pipes before placing it in the centrifuge, (86%) of respondents disinfecting all contaminated instruments, (25.6%) from respondents don't recap the needle after use, while (32.6%) of respondents wearing mask N95 when dealing with infectious samples. More than a third of respondents (38.3%) disinfect the cabinet after each test, and (82.6%) of respondents sterilizing instruments after handling Petri dishes.

4. Discussion

This study included 86 health workers. Their mean age was 32.6±4.8 years, with median age 30 years, age was ranged from 23 years to 47 years. Male constitute to (25.6%) and female (74.4%), female to male ratio was 2.9:1. Majority of respondents (81.4%) had University level education, while the rest had high institute (11.6%) and middle institute (7%). Duration of work ranged from 1 year to 23 years in average 5.96 ±4.42 years with median 5years.

4.1 Knowledge

Most respondents (76.7%) were aware of the correct way of hand washing by water, soap and disinfectant, while (23.3%) of respondents think that water and soap sufficient for hand washing. In similar study conducted in Gaza strip, whose results showed (95.3%) of respondents wash hands with soap and water only. (Ashraf, 2015).

The majority of health workers aware about the importance of changing gloves after each test by (74.5%), but (17.4%) of workers changing gloves once a day and (8.1%) of workers change gloves only if disrupted.

More than a half (60.5%) of respondents know the importance of wearing face mask, in comparison with (39.5%) of respondents not wearing face mask. This finding was considerably comparable with a study conducted in Namibia were (42%) respondents wearing face mask. (Haoses, 2005). Another study done by Kale and others showed (40%) of the respondents wearing face masks. (Milind, 2014). A study done on laboratory technicians by Zaveri and Karia, showed (25.5%) of respondents wearing facemasks. (Jitendra, 2012). A Pakistani study on clinical laboratory workers their result was (0.7%) of respondents wearing facemasks. (Sadia, 2012).

The vast majority (90.7%) of respondents aware about impropriety of re-use of needles and syringes, conversely with (9.3%) of respondents thought propriety of re-use of needles and syringes after sterilization. In similar study conducted in Pakistan that shown (24%) of respondents re-use disposable syringe. (Sadia, 2010).

Nearly all respondents (94.2%) thought that germs can transmite by needle stick and (5.8%) believed the opposite. In similar study done in Namibia where (100%) of

respondents aware that diseases can be transmitted through needle stick injuries. (Haoses, 2005). In addition, the Nigerian study that shown (72.1%) of respondents know HBV and HCV can be transmitted through needle stick injuries and entrenched at around half the results with the Sudanese study (47.7%) of respondents thought it would be infectious. (Emmanuel, 2012), (Mohamed, 2016).

Regarding knowledge, in this study health worker's knowledge about the right mode of transmission of hepatitis B virus was (54.6%), hepatitis C virus was (57%) and HIV virus was (43%). In similar study in Nigeria on laboratory workers that exhibited (77%) of the study population were aware the right mode of transmission of HBV and HCV (Emmanuel, 2012), while in study done in Sudan showed hepatitis B virus (95.9%), hepatitis C virus (90.7%) and HIV virus (99.1%) of respondent's knowledge about mode of transmission of those viruses. (Mohamed, 2016).

More than half (67.4%) of respondents had a correct knowledge about vaccination against hepatitis B virus, that vaccine doesn't prevent the infection but decreases the chance of occurrence, while (32.6%) of them don't have this knowledge. In Kale's study the result was (98%) of the respondents choose vaccine of hepatitis B prevent the infection. (Milind, 2014).

Knowledge of respondents about dealing with *Mycobacterium Tuberculosis* need a special laboratory (65.1%), but the rest of the respondents in the study were unaware to deal with TB so that their answers were as follows (26.8%) of respondents in special cabinet and (8.1%) of respondents any cabinet in laboratory.

The knowledge of respondents about separation of the medical waste into sharp and non-sharp by (62.8%), while (37.2%) of them didn't do any separation of medical waste. The finding was congruence with a previous study conducted in Nigeria, which reported that respondents had knowledge which was (68.3%) of the them would drop sharps in special containers for sharps. (Agu, 2015). In study done by Nagaraju B. and others, where their study registered knowledge regarding classification was (45%).(Nagaraju, 2013). In Pakistani study, their result was (37.5%) laboratory workers discard sharps properly or place used syringes in separate sharp containers. (Sadia, 2010). In addition, other study done in Pakistan (33.3%) of respondents separate discarder for sharp-edged things. (Sadia, 2012). In other study done in Namibia their result was (90%) of respondents discard used

needles as well as sharp instruments directly after use into a special container for sharp instruments. (Haoses, 2005).

4.2 Attitude

Most of the respondents (87.2%) were had a positive attitude about the precaution when dealing with infectious diseases, compared to (12.8%) had a negative attitude to taking precaution.

Magnificent proportion of respondents show positive attitude (80.2%) to telling doctor after exposed to needle stick, in contrary (19.8%) had negative attitude about telling doctor after exposed to needle stick.

The proportion of positive attitude of carry on work when injured (81.4%), and (18.6%) had negative attitude to caring work when injured.

Only (19.7%) of respondents were considered as had positive attitude to felt make mistakes while performing work, (80.3%) were taken as had negative attitude.

The attitude of the (72.1%) of respondents to wards eating inside lab was positive, and negative for (27.9%). This finding was similar to other study on laboratory technicians in India, their result was (75%) of technicians against eating in laboratory . (Himanshu, 2015). In anthor study that made by Zaveri and Karia, the outcome was (54.4%) of the technicians that disapprove eating in lab. (Jitendra, 2012). Where it was found positive attitude to wards eating inside lab was (35.8%) in a study in Karachi, Pakistan. (Sadia, 2010). Another Pakistani study done on lab workers came out with (29.7%) of them do not eat nor drink in laboratory. (Sadia, 2012). In Gaza strip study, the result was (25%) of them do not eat nor drink in laboratory. (Ashraf, 2015).

The vast majority of respondents had positive attitude to smoke cigarettes inside lab (91.9%). It's comparable to a study done by Zaveri and Karia showed (87.93%) of technicians assure no smoking in laboratory [(39)], where In India a study reveals that (66.7%) of the technicians do not smoke in laboratory [(32)].

Regarding attitude, most of the respondents (76.8%) had positive attitude to apply cosmetics in the lab, while (23.2%) had negative attitude. This result was near to a study done on laboratory technicians by Zaveri and Karia, they got a result as (31.5%) of technicians apply cosmetics in Laboratory. (Jitendra, 2012). In Gaza's study where their result was (25%) of them prohibited to apply cosmetics. (Ashraf, 2015).

The vast majority of respondents had positive attitude to bite their nails inside lab (91.9%), however (8.1%) had negative attitude. This finding was considerably comparable with a study conducted on laboratory technicians by Zaveri and Karia whose results of cutting the finger nails with teeth in lab was (10%). (Jitendra, 2012).

Wearing gloves with any of jewelry for example ring, more than half of respondents (58.1%) were recorded for did not wear any of them that demonstrated a positive attitude, while less than half of the participants (41.9%) demonstrated negative attitude.

More than half of respondents (59.3%) exhibited negative attitude about taking their coat to home, while (40.7%) of respondents exhibited positive attitude.

Value of positive attitude of worker of using lab refrigerator to store food and beverage (82.6%), while (17.4%) had negative attitude. In study done in India which resulted (41.7%) of technicians storage the food and beverage in lab refrigerator. (Himanshu, 2015). Another sudy done by Zaveri and Karia which resulted that (47.0%) of technicians storage the food and beverage in lab refrigerator. (Jitendra, 2012).

A significant proportion of respondents (87.2%) had negative attitude about taking shower immediately after left lab, while positive attitude of respondents was (12.8%). In Zaveri and Karia study where their result was (1%) of technicians take shower immediately after left lab. (Jitendra, 2012).

The positive attitude of worker of using pipette by mouth was (80.2%), while (19.8%) had negative attitude, this difference was statistically significant p value = 0.05.

More than half of respondents (55.8%) had a positive attitude to conduct tests away from the cabinet, (44.2%) was exhibited negative attitude, this difference was statistically significant p value = 0.011.

4.3 Practice

Washing hands immediately after completing work was recorded by (94.2%) of the respondents which considered as a good practice, but (5.8%) had inadequate or poor practice. In Indian study where their result was (75%) from technicians leave lab without proper hand washing. (Himanshu, 2015).

The vast majority of respondents (98.8%) considerable had a good practice in closing of pipes before placing it in the centrifuge, but only (1.2%) of respondents had poor practice. In two studies done in Pakistan with following results (73.3%) and (65.8%) respectively of laboratory workers covers samples in centrifuge machine(Sadia, 2012), (Sadia, 2010).

The proportion of good practice of respondents to disinfecting all contaminated instruments by (86%), while (14%) had inadequate or poor practice.

Nearly three-quarters of respondents (74.4%) were had poor practice to recap the needle after use, while (25.6%) of respondents had good practice. In study done in Nigeria (19.2%) of respondents were not recapping needles (Agu, 2015), while in the Nepalese study the percentage was (21%).(Gurubacharya, 2003). In two other studies done in Pakistan the result as follows; (51.7%) and (62.5%) were not recapping needles (Sadia, 2012), (Sadia, 2010), while in Lebanese study, the result was (67.1%) (Ibtissam, 2013). In other study done in Saudi Arabia the percentage of respondents who had good practice was (71%) (Maqbool, 2002), while in another Indian studies the result was (91.3%) and all respondents in study done by Puneet were not recapping needles (Malini, 2015), (Puneet, 2016).

Around a third (32.6%) of respondents performed good practiceto wear mask N95, while a larger proportion of the respondents (67.4%) never performed a good practice.

More than half (53.5%) of the respondents had good practice of writing a report after needlestick, but (46.5%) of the respondents exhibited inadequate practice. In Saudi Arabia study it's found that (8%) of respondents write a report after needle stick (Maqbool, 2002), while in the Indian study was (15%) (Puneet, 2016) and also it's found respondents who write a report after needle stick in Nepalese study and Indian study was (21%) & (34.8%) (Gurubacharya, 2003), (Malini, 2015), while in study done by Kale the percentage of respondents was (60.5%) had good practice and in Lebanese study was (75.9%) (Milind, 2014), (Ibtissam, 2013). As well as in Sudanese study the result was (92.2%) needle stick injuries were reported. (Mohamed, 2016).

Less than half of respondents (43%) performed a good practice of using standard operating procedures, on other hand a sizeable percent (57%) of respondents had

inadequate practice. In two studies done in Pakistan the result was (32.5%) and (28.3%) were operating with written standard operating procedures (Sadia, 2012), (Sadia, 2010).

Regarding to testing vaccine's effectiveness against HBV about a quarter of respondents (25.6%) had a good practice, but the majority of respondents (74.4%) had poor practice, the same results of poor practice obtained from studies, in indian was (86%) (Gurubacharya, 2003), also in Sudanese was (86.5%) (Mohamed, 2016), and Saudi Arabia was (90%) (Maqbool, 2002), where they were not checked Anti HBs antibodies after HB vaccination.

More than half of respondents (59.3%) exhibited good practice about examining themselves from some infectious diseases, while (40.7%) of respondents exhibited poor practice.

The vast majority of respondents had good practice to develop themselves to avoid mistakes (94.2%) conversely with (5.8%) were had inadequate practice.

The good practice of workers regarding the completion of all doses of vaccine against hepatitis B virus was (47.7%) compared with a sizeable percent (52.3%) who had inadequate practice, while (8.5%) of respondents in Zaveri study had completed three 3 doses of vaccine against hepatitis B virus (Jitendra, 2012), in Nigerian study the percentage of good practice in respondents was (29.78%) (Emmanuel, 2012) and (44%) in study done in Namibia (Haoses, 2005), while (60%) of respondents in Nepalese study had completed three 3 doses of vaccine against hepatitis B virus (Gurubacharya, 2003), in Sudanese study the percentage of good practice was (65.4%) (Mohamed, 2016), also in the Indian study was (66%) (Puneet, 2016), also in another Indian study was (73.9%) (Malini, 2015), while in study done by Shekhar was (75%) (Himanshu, 2015), in Saudi study was (84%) (Maqbool, 2002) and (87.0%) of respondents in Nigerian study had completed three 3 doses of vaccine against hepatitis B virus (Mercy, 2016).

A markable percent (77.9%) of respondents had poor practice about wearing gloves when their entering lab, and less than quarter of respondents only had good practice. In Pakistani study (12.3%) of respondents, use gloves all the time (Sadia, 2010), while in Lebanon study the percentage was (43.3%) (Ibtissam, 2013), also in study done in Namibia the percentage of respondents whose wearing gloves all the time was (42%) (Haoses, 2005) and in Indian study was (50%). (Himanshu, 2015). However, other study done in Gaza was

(79.5%) of respondents had good practice about wearing gloves (Ashraf, 2015), so on in Nigerian study the percent was (89.3%) (Agu, 2015), and in Zaveri study all respondents use gloves all the time. (Jitendra, 2012).

The majority of respondents performed a good practice of wearing coat when they are entering the lab was (82.5%), while (17.5%) never performed a good practice of wearing coat when entering lab. In Zaveri study the percentage was (71.4%) of respondents wearing coat when enter lab (Jitendra, 2012), also in Gaza study the percentage was (79.5%) (Ashraf, 2015), in other study done in India the percentage was (83.3%) comparable with this study of respondents wearing laboratory coats (Himanshu, 2015), while in study done in Malaysia the percentage was (38.5%) and in Pakistan was (19.4%) of laboratory technicians wear lab coat (Olumide,2013), (Sadia, 2010).

The major proportion (88.4%) of respondents show poor practice about washing their lab coat with other clothes, compared to (11.6%) show good practice.

More than third (34.9%) of respondents recorded a good practice about wearing goggles when dealing with samples, while the highest percent (65.1%) of respondents were inadequate or poor practice to wearing goggles. These finding was concur witha study conducted by Kale which was (40%) of respondents were wearing goggles and in another study done in Namibia the percentage was (42%) (Milind, 2014), (Haoses, 2005). In other hand the highest percent was recorded in Gaza study (79.5%) of respondents wearing goggles (Ashraf, 2015), and in study done on laboratory workers in Nigeria the percentag was (8.4%) (Emmanuel, 2012), while in Pakistan the percentag was (0.8%) of respondents wearing goggles (Sadia, 2010).

More than a third of respondents (38.3%) recorded a good practice of disinfection the cabinet after each test, while a majority of them (61.7%) never performed a good practice. It's comparable with study done in Karachi, Pakistan were (24.2%) of laboratory technicians disinfectant the cabinets after each test (Sadia, 2010), while an another study done in Pakistan (76.3%) of laboratory workers disinfect the cabinets after each test. (Sadia, 2012).

The majority of respondents performed a good practice to sterilizing instruments after handling Petri dishes by (82.6%), but (17.4%) never performed a good practice.

5.1 Conclusion

Concluded from this study, a significant number of health workers in medical laboratories in Benghazi medical center had knowledge about biological hazards, most of lab workers had a positive attitude to word the biological hazards, although the lab workers were exhibited inadequate practice.

5.2 Recommendations

- Improve and update the lab workers' knowledge about biological hazards through promoting training programs about biological hazards and help them how to translate these knowledge into practice.
- Specific books, handouts and leaflets include comprehensive information about dealing with biological hazards in Arabic language should be available for each lab procedure.
- Developing training materials to increase the safety of the lab worker through improved use of Personal protective equipment (PPE) and practice hand washing.
- An ongoing, well-structured infection control education program should be initiated in laboratories.
- Farther researches on large scale for knowledge, attitude and practice of biological hazards is recommended.

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Appendix I

Assessment of knowledge, Attitude and Practice of Biological Hazards Among Health Workers in Medical Laboratories in Benghazi Medical Center

استبيان

1 العمر .....

2 الجنس □ ذكر □ انثى

3 المؤهل العلمي : □ جامعي, □ معهد عالي, □ معهد متوسط غير ذلك .....

4 عدد سنوات العمل ( )

5 الطريقة الصحيحة لغسيل اليدين تكون باستخدام: □ بالماء والصابون, □ بالماء والصابون والمطهرات

6 تغير القفازات يكون: □ مرة واحدة عند الانتهاء من العمل, □ اذا تمزقت فقط, □ بعد كل اختبار

7 هل ترتدي الكمامات: □ نعم □ لا

8 هل تنصح بإعادة استخدام الابر و السرنجات بعد تعقيمها بشكل جيد : □ نعم □ لا

9 هل يمكن ان تنتقل الجراثيم بواسطة وخز الإبر: □ نعم □ لا

10 طرق انتقال التهاب الكبد الفيروسي ب (HBV) : □ الدم □ المخالطة □ كل سوائل الجسم

11 طرق انتقال التهاب الكبد الفيروسي ج (HCV) : □ الدم □ المخالطة □ كل سوائل الجسم

12 طرق انتقال فيروس نقص المناعة البشرية (HIV) : □ الدم □ المخالطة □ كل سوائل الجسم

13 التطعيم ضد التهاب الكبد الفيروسي ب (HBV) : □ يمنع الاصابة بالعدوى □ يقلل من فرص حدوث العدوى

14 يتم التعامل مع بكتيريا السلMycobacterium tuberculosis : □علي طاولة المعمل □ في مكان مخصص □ في مختبر مخصص

15 يتم فصل النفايات الطبية عن طريق : □ تجمع كلها في نفس الوعاء □ فصل النفايات الحادة عن النفايات غير الحادة

16 هل تأخذ الاحتياطات اللازمة عند التعامل مع عينة تحتوي احد الامراض المعدية : □ نعم □ لا

17 اذا تعرضت لوخز الابر هل تخبر الطبيب: □ نعم □ لا

18 لو اصبت بجرح وأنت تعمل هل تكمل عملك: □ نعم □ لا

19 هل تستخدم الماصة بالفم: □ نعم □ لا

20 هل سبق لك وان اجريت بعض الاختبارات بعيدا عن الطاولة (cabinet): □ نعم □ لا

21 هل تشعر بأنك ترتكب اخطاء اثناء تأديتك للعمل: □ نعم □ لا

22 هل تأكل داخل المعمل: □ نعم □ لا

23 هل تدخن السجائر داخل المعمل: □ نعم □ لا

24 هل تستعملين مساحيق التجميل وأنت في المعمل (العناصر النسائية) : □ نعم □ لا

25 هل تقلم اظافرك داخل المعمل: □ نعم □ لا

26 هل ترتدي القفازات فوق المجوهرات مثلا الخاتم: □ نعم □ لا

27 هل تأخذ المعطف معك للمنزل: □ نعم □ لا

28 هل تستخدم ثلاجة المعمل لحفظ الاطعمة: □ نعم □ لا

29 هل تستحم عند مغادرة المعمل مباشرة: □ نعم □ لا

30 هل تغسل يديك مباشرة بعد الانتهاء من العمل: □ نعم □ لا

31 هل تتأكد من اغلاق الانابيب قبل وضعها في جهاز الطرد المركزي centrifuge : □ نعم □ لا

32 عند الانتهاء من العمل هل تقوم بتعقيم كافة الادوات الملوثة: □ نعم □ لا

33 هل تقوم بإعادة غطاء ابرة الابرة بعد استخدمها: □ نعم □ لا

34 هل يتم استخدام قناع الجهاز التنفسي(Mask N95)عند التعامل مع العينات البيولوجية الخطرة (المعدية): □ نعم □ لا

35 هل يتم كتابة تقرير بعد التعرض لوخز الابر: □ نعم □ لا

36 هل يتم استخدام طرق العمل القياسية standard operating procedures مكتوبة عند اختبارات عزل البكتيريا :
□ نعم □ لا

37 هل قمت باختبار فعالية التطعيم المضاد لالتهاب الكبد الفيروسي ب (HBV) : □ نعم □ لا

38 هل تقوم بفحص نفسك بخطر وجود بعض الامراض المعدية : □ نعم □ لا

39 هل حاولت ان تطور من معلوماتك و مهاراتك لتجنب الاخطاء أثناء العمل: □ نعم □ لا

40 هل أكملت جرعات التطعيم ضد التهاب الكبد الفيروسي ب (HBV): □ نعم □ لا

41 هل ترتدي القفازات بمجرد دخولك للمعمل: □ نعم □ لا

42 هل ترتدي المعطف بمجرد دخولك للمعمل: □ نعم □ لا

43 عند غسل المعطف هل يتم غسله مع باقي الملابس: □ نعم □ لا

44 هل ترتدي النظارات الواقية عند التعامل مع العينات: □ نعم □ لا

45 هل تقوم بتطهير الطاولة (cabinet) بعد كل اختبار: □ نعم □ لا

46 عند التعامل مع مزارع الجراثيم هل تقوم بتعقيم الأدوات بعد استخدامها: □ نعم □ لا

تقييم المعرفة والمواقف والممارسات من المخاطر البيولوجية بين العاملين في المختبرات الطبية بمركز بنغازي الطبي

اعداد

معتز ونيس محمد

المشرف

أ.د. تونس محمود ميدان

الملخص

الهدف: تقييم المعارف والمواقف والممارسات المتعلقة بالأخطار البيولوجية بين العاملين الصحيين في المختبرات الطبية في المركز الطبي في بنغازي. **طريقة إجراء الدراسة:** دراسة وصفية مقطعية. **النتائج:** شملت هذه الدراسة 86 عاملا صحيا. وكان متوسط أعمارهم 32.6 ± 4.8 سنوات . الذكور (25.6٪) والإناث (74.4٪). وكان معظم المشاركين (76.7٪) مدركين الطريقة الصحيحة لغسل اليدين. في حين أن (74.5٪) مدركين أهمية تغيير القفازات بعد كلّ اختبار، و (90.7٪) من المشاركين مدركون انه غير ممكن إعادة استعمال الإبر والحقن. وكان معظم المشاركين (87.2٪) لديهم موقفا ايجابيا حول الاحتياطات عند التعامل مع الامراض المعدية، ونسبة المشاركين اظهروا موقف الإيجابي في اخبار الطبيب بعد التعرض إلى وخز الإبر (80.2٪). حوالي (32.6٪) حوالى ثلث (32.6 %) المشاركين كانت ممارستهم جيدة للبس القناع N95، أكثر من نصف (53.5 %) المشاركين كان عندهم ممارسة جيدة في كتابة التقرير بعد التعرض الي وخز الإبر. أكثر من ثلث (34.9 %) من

المشاركين سجّل ممارسة جيدة حول النظارات الوقاية عندم التعامل مع العينات. **الخلاصة:** أظهرت هذه الدراسة أن عددا كبيرا من العاملين في المختبرات لديهم معرفة بالمخاطر البيولوجية، ومعظم العاملين في المختبر لديهم موقف إيجابي حول المخاطر البيولوجية، على الرغم من أن بعض العاملين في المختبر عرضوا ممارسة غير كافية.

تقييم المعرفة والمواقف والممارسات من المخاطر البيولوجية بين العاملين في المختبرات الطبية بمركز بنغازي الطبي

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قدمت هذه الرسالة استكمالا لمتطلبات الحصول على درجة الماجستير في الصحة البيئية.

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كلية الصحة العامة

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