Preventive Measures among Hospital Laboratory Employees regarding Occupational Health Hazards

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Abstract

Background: The practices of safety measures by the clinical laboratory workers in hospitals are necessary for the prevention of occupational hazards. **Aim of the study:** Was to assess preventive measures among hospital laboratory employees regarding occupational health hazards. **Research design:** A descriptive research design was used in this study. **Setting:** The study was conducted in Benha Hospitals at four laboratory departments namely; Benha University Hospitals, Fever Hospital, Benha Teaching Hospital and Health Insurance Hospital. **Sample:** A convenient sample of 108 hospital laboratory employees from the previously mentioned settings were involved in the study. **Tools:** Two tools were used to collect data. **Tool I:** A structured interviewing questionnaire to assess laboratory employees' socio-demographic characteristics, work characteristics, knowledge about occupational health hazards and its preventive measures. **Tool II:** An observational checklist for safe laboratory environment and practices of laboratory employees regarding prevention of occupational hazards. **Results:** 33.3% of the studied laboratory employees aged from 30 to less than 40 years old with mean age 32.25±5.07, 38% of them had skin inflammation, 29.6% of them exposure to needle stick injuries. Moreover 47.2% of them had good total knowledge score while 73.1% of them had total unsatisfactory practices. **Conclusion:** There was a highly statistically significant correlation between total laboratory employees' knowledge and their total practices regarding prevention of occupational health hazards ($p<0.001$). **Recommendations:** Continuous training courses about laboratory safety measures should be provided for laboratory employees.

Key words: Clinical Laboratory Workers, Occupational Hazards, Safety Measures.

Introduction

Medical laboratory deals with almost all medical conditions, which is a medical specialty complementary to other specialties as it is very important and irreplaceable. The Laboratory Medicine is considered as one of basic medical branches and complementary to all other disciplines, where most clinicians need the laboratory reports to complete the examination of patients; as clinicians depend on reports for proper diagnosis, treatment plan, and follow-up treatment **(Lane et al., 2022).**

Occupational health hazards are the risk for the health of a worker usually arising out of employment. Occupational health hazards also refer to process or situation that causes accidents or disease at work place. Occupational health hazards are brought by unsafe work conditions and unsafe work behaviors. Workplace hazards or injuries are preventable with the use of appropriate occupational safety and health services **(Ndejjo, 2017).**

Occupational health hazards in the workplace can be found in a variety of forms,

including chemical, physical, biological and psychological. Because of the multitude of hazards in most workplaces and the overall lack of attention given to health and safety by many employers, work- related accidents and diseases continue to be serious problems in all parts of the world **(Izadi & Piruznia, 2018).**

Occupational Health Nursing (OHN) plays an important role in the prevention and management of occupational health hazards. The main duties of OHN include recognizing and preventing hazards in the work place, educating laboratory employees on personal protective equipment and strategies for prevention and management of occupational health hazards. It also includes assessing work environment, informing the employees of common workplace illness and injuries, documenting illness and injuries and follow up the protocol of post exposure **(Gangadharan et al., 2021).**

Community Health Nurse (CHN) can play a major role in protecting, preventing and improving the health of laboratory employees. CHN is one that is focused on health promotion, illness and injury prevention, and the protection of laboratory employees from occupational and environmental hazards. CHN prevent, diagnose and deal with occupational and environmental diseases and injuries that occur in laboratory department. CHN also provide rehabilitation of laboratory employees who have already been affected by a disease or injury to soften the impact of an ongoing illness or injury that has lasting effects **(Georgiev et al., 2019).**

Significance of the study:

Health Care Workers (HCWs) in Egypt are at particular risk of Hepatitis C Virus (HCV) infection and other blood borne pathogens, with an estimated annual number of needle stick injuries of 4.9 per HCW, a high reservoir of HCV infection in the patient population and an estimated 66% of HCV infections being attributed to occupational exposures. Egypt has been considered one of the most endemic countries for HCV infection. So, laboratory personnel work in close contact with patients in Egypt are at increased risk of HCV infection and other blood borne pathogens, with an estimated annual number of 4.9 needle sticks. HCV infection may be presented either in acute form tending to be asymptomatic or chronic form. Progression to persistent or chronic infection occurred in about three quarters of cases with variable rates of the fibrosis progression **(Ameen et al., 2020).**

Aims of the study:

This study aimed to assess preventive measures among hospital laboratory employees regarding occupational health hazards.

Research Questions

1. What is laboratory employees' knowledge regarding occupational health hazards and preventive measures?
2. What is laboratory employees' practice regarding preventives measures of occupational health hazards?
3. Is there a correlation between employees' knowledge and their practices regarding occupational health hazards in laboratories?
4. Is there a relation between employees' socio demographic characteristics and their knowledge?
5. Is there a relation between employees' socio demographic characteristics and their practices?

Subject and Methods

Research Design:

A descriptive research design was used in carrying out this study. Descriptive research design is a type of research design that aims to obtain information to systematically describe a phenomenon, situation, or population. More specifically, it

helps answer the what, when, where, and how questions regarding the research problem, rather than the why.

Setting:

The study was conducted in Benha Hospitals at four laboratory departments namely; Benha University Hospitals, Fever Hospital, Benha Teaching Hospital and Health Insurance Hospital.

Sampling:

A convenient sample 108 of hospital laboratory employees from the previous mentioned settings included in this study throughout six months from the beginning of the study; classified as follows:- (49 from Benha University Hospital, 20 from Fever Hospital, 19 from Teaching Hospital and 20 from Health Insurance Hospital).

Tools of data collection: Two tools were used to collect the necessary data:

The first tool: A structured interviewing questionnaire: It was developed by the researcher based on reviewing related literatures, and it was writes in simple clear Arabic language. It composed of two parts:

First Part: It included A); socio-demographic characteristics of laboratory employees involved 6 closed ended questions in the study age, sex, residence, marital status, education level, and monthly income.

B); Working condition of the studied laboratory employees. It involved 8 closed ended questions place of work, nature of job, years of experience, daily working hours, taken training courses, number of training courses taken, the title of the training courses taken, and the place of these courses.

The second part: **It consisted of two sections:**

Section A: It was designed to assess laboratory employees' knowledge about occupational health hazards. This included 8 questions about meaning, causes, and types of occupational hazards, biological hazards, chemical hazards, physical hazards, electrical hazards, and psychological hazards.

Section B: It was designed to assess laboratory employees' knowledge about preventive measures regarding occupational health hazards. It included 8 questions about meaning of occupational health and safety, meaning of preventive measures, its importance, preventive measures of biological, chemical, physical, electrical, and psychological hazards.

Scoring system for the knowledge items adapted as follows:

The scoring system for laboratory employees' knowledge was calculated as follows (2) score for correct & complete answer, while (1) score for correct & incomplete answer, and (0) for don't know or wrong answer for each question of knowledge. The scores of items were summed up and the total was divided by the number of the items, these scores were converted into percent score.The total knowledge scores were considered good if the score of the total knowledge ≥75 % (≥24 points), considered average if it is equals 50-<75% (16-<24points) and considered poor if it is less than 50% (<16 points).

Tool II: Observational checklists which modified from (Seiler, 2014): It was concerned with the following two parts:

The first part: It was designed to assess the practices of laboratory employees regarding prevention of occupational hazards. It included 8 areas divided into 43 items about wearing protective clothes, hand washing steps, time of hand washing, laboratory dress code, disposal of hazardous medical waste, laboratory safety, when exposed to needle stick injuries, and when exposed to inhaling a chemical substances.

Scoring system:

The scoring system for laboratory employees' practices was calculated as follows: (1) score if done, and (0) score if not done. The scores of items were summed up and the total was divided by the number of the items, giving mean score the part. These scores were converted into percent score. The total practices scores were considered satisfactory if the score of the total practices > 75% (>65 score), while considered unsatisfactory if it is ≤ 75% (≤ 65 score).

The second part: It was designed to observe the work environmental condition of laboratory employees which include 11 items about workplace, floors, lighting, ventilation, equipment, storage places, staff facilities, needle disposal place, fire protection, protection from electrical hazards, and water supply system.

Scoring system:

The scoring system for the work environmental condition in the laboratory was calculated as follows: (1) score if present, and (0) score if not present the environmental setting. The scores of items were summed up and the total was divided by the number of the items, giving mean score the part. These scores were converted into percent score. The total score was considered sanitary if the score > 75% (>8 score), while considered unsanitary if it is ≤ 75% (≤ 8 score).

Validity of the tools:-

The validity was done by five experts of Nursing Faculty's staff from the Community Health Nursing Specialties, who reviewed the tools for clarity, relevance, comprehensiveness, and applicability.

Reliability of the tools:-

Reliability of the tools was applied by the investigator for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar condition on one or more occasion. Answers from repeated testing were compared. Reliability for knowledge was 0.937 and for practice was 0.709.

Ethical consideration:

All ethical issues were assured. Oral formed consent has been obtained from each laboratory employees before conducting the interview and given a brief orientation to the purpose of the study. They were also reassured that all information gathered would be treated confidentially and used only for the purpose of the study. The laboratory employees had right to withdraw from the study at any time without giving any reasons.

Pilot study:

The pilot study was carried out on 10% of laboratory employees which represented 11 employees. The pilot study was aimed to assess the tools clarity, applicability and time needed to fit each sheet, completing the sheet consumed about 20 minutes. No modifications were done, so the pilot study sample was included to the total sample of the study.

Field work:

Preparation of the data collection tools was based on reviewing the current and past available national and international related literatures, and the theoretical knowledge of various aspects of the study using a journal, text books and internet research. This was necessary for the investigator to be acquainted with and oriented about aspects of the research problem as well as to assist in the development of data collection tools.

The actual field work was carried out over a period of 3 months from the start of February to the end of April 2022; the study conducted by the investigator for the studied sample in the selected settings. The investigator visits the selected settings for 4 days/week (Sunday, Monday, Tuesday, and Wednesday) from 9

am to 12 pm because in these days there are exchanges of shifts among employees and majority is exists. The investigator explained the purpose and importance of the study to the employees. The investigator collected data from the employees. The average number of the studied employees was between 2-3 employees/day depending on their response to the interviewers, each interviewed employee takes about 10 to 20 minutes to fill the sheet depending upon their understanding and response.

Statistical analysis:

Computerized data entry and statistical analysis were fulfilling scored using Statistical Package for Social Science **(**SPSS), version (25). Descriptive statistics were first applied (percentage) then other statistical test such as, Chi-square and using mean.

Statistical significance was considered:

- Highly significant result when P- value <0.001.
- Significant result when P- value < 0.05.
- Non- significant result when P-value>0.05.

Results:

Table (1): Shows that; 33.3% of the studied laboratory employees aged from 30 to less than 40 years old with X±SD= (32.25±5.07), 55.6 % of them were female, 50.9% were living in rural area, 70.4% were married, 68.5 % had secondary education, and monthly income was enough for 59.3 % of them.

Table (2): Shows that; 52.8% of the studied laboratory employees were laboratory technician. As regard experience years; 36.1% of the studied employees had less than five years, and 64.8% were working for six hours per day. This table also shows that; 71.3% of the studied laboratory employees didn't receive training courses, 41.9% of them received two courses, 54.8% had received training courses about infection control measures. According to the place of courses; 80.6% received the courses outside the hospital.

Figure (1): Illustrates that; 47.2% of the studied laboratory employees had good total knowledge regarding occupational health hazards and its preventive measures, while 45.4% of them had average knowledge and 7.4% had poor knowledge.

Figure (2): Reveals that; 73.1% of the studied laboratory employees had unsatisfactory total practices' score regarding prevention of occupational health hazards while 26.9% of them had satisfactory total practices.

Table (3): Reveals that; there was a highly statistically significant relation between total knowledge and practices' scores of the studied laboratory employees regarding occupational health hazards. (p<0.001).

Table (4): Shows that; there was a highly statistically significant relation between total knowledge score of the studied laboratory employees and their sex, marital status, and education (P value 0.001**). While there was statistically significant relation between total knowledge score of the studied laboratory employees and their monthly income (P value < 0.05). Also there was no statistically significant relation between total knowledge score of the studied laboratory employees and their age, and residence (P >0.05).

Table (6): Reveals that; there was highly statistically significant relation between total practices score of the studied laboratory employees and their education, and monthly income (P value <0.001) While there was no statistically significant relation between total practices score of the studied laboratory employees and their age, sex, residence, and marital status (P value<0.05).

Table (1): Frequency distribution of the studied laboratory employees regarding their socio demographic. characteristics (n=108).

Socio-demographic characteristics	No.	%
Age / Years		
<20	14	13.0
20-	29	26.9
30-	36	33.3
40+	29	26.9
Mean ±SD	**32.25±5.07**	
Sex		
Male	48	44.4
Female	60	55.6
Residence		
Urban	53	49.1
Rural	55	50.9
Marital status		
Single	23	21.3
Married	76	70.4
Divorced	6	5.6
Widowed	3	2.8
Educational level		
Not read or write	9	8.3
Read and write	6	5.6
Basic education	4	3.7
Secondary education	74	68.5
University education	15	13.9
Monthly income		
Enough and saving	13	12.0
Enough only	64	59.3
Not enough	31	28.7

Table (2): Frequency distribution of the studied laboratory employee regarding their work characteristics (n=108).

Items	No.	%
Nature of job		
Supervisor	12	11.1
Technician	57	52.8
Nurse	20	18.5
Worker	19	17.6
Experience years		
1:<5	39	36.1
5:<10	38	35.2
+10	31	28.7
Daily work hours		
6 hours	70	64.8
12 hours	30	27.8
24 hours	8	7.4
Received training courses		
Yes	31	28.7
No	77	71.3
No. of courses (n=31).		
2 courses	13	41.9
3 courses	10	32.3
4 courses or more	8	25.8
***Training courses**		
Infection control	17	54.8
Laboratory technology	13	41.9
Laboratory quality management	13	41.9
First aid	16	51.6
The place of courses (n=31).		
Inside the hospital	6	19.4
Outside the hospital	25	80.6

***The answers aren't mutually exclusive**

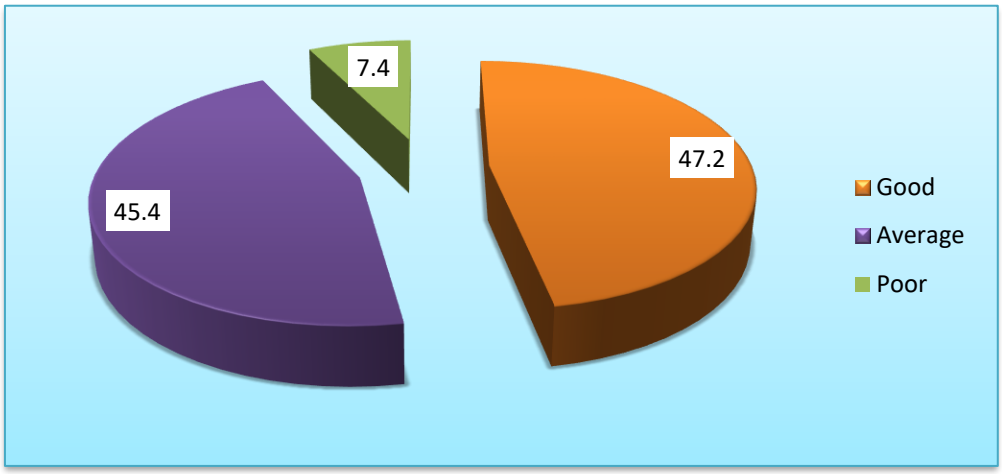

Figure (1): Percentage distribution of the studied laboratory employee regarding their total knowledge level about occupational health hazards and its preventive measures (n=108).

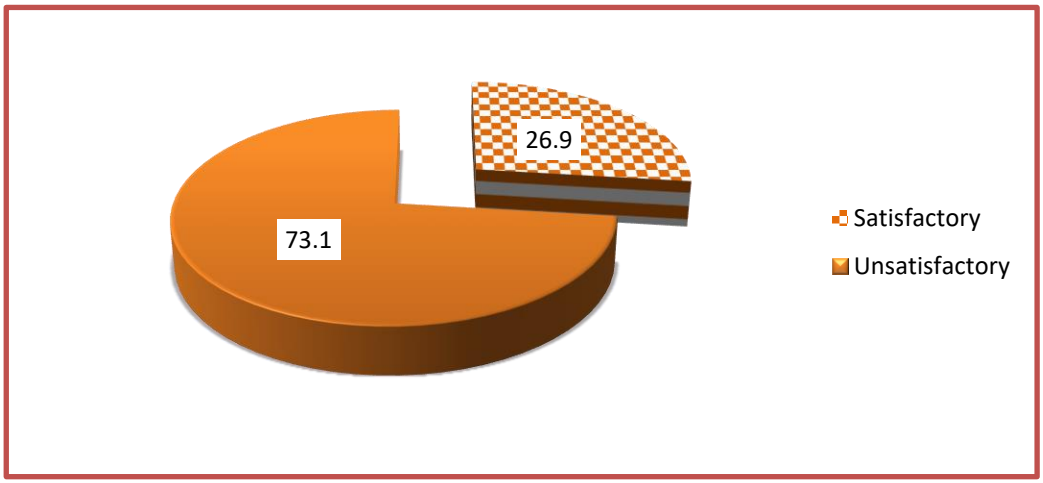

Figure (2): Percentage distribution of the studied laboratory employees' total practices regarding prevention of occupational health hazards (n=108).

Table (4): Statistically relation between total knowledge and total practices of the studied laboratory employees regarding occupational health hazards (n= 108).

Practices level	Knowledge level (n=108)							
	Poor (n=8)		Average (n=49)		Good (n=51)		X^2	p-value
	No.	%	No.	%	No.	%		
Unsatisfactory	1	12.5	38	77.6	40	78.4	16.19	0.00**
Satisfactory	7	87.5	11	22.4	11	21.6		

Table (5): Statistically relation between socio-demographic characteristics of the studied laboratory employees and their knowledge regarding occupational health hazards and its preventive measures (n=108).

Socio-demographic characteristics	Total knowledge score						X^2	p-value
	Poor (n=8)		Average (n=49)		Good (n=51)			
	No	%	No	%	No	%		
Age/Years								
<20	0	0.0	6	12.2	8	15.7	7.554	0.273
20-	0	0.0	16	32.7	13	25.5		
30-	4	50.0	17	34.7	15	29.4		
40+	4	50.0	10	20.4	15	29.4		
Sex								
Male	3	37.5	13	26.5	32	62.7	13.44	0.001**
Female	5	62.5	36	73.5	19	37.3		
Residence								
Urban	4	50.0	26	53.1	23	45.1	0.637	0.727
Rural	4	50.0	23	46.9	28	54.9		
Marital status								
Single	0	0.0	8	16.3	15	29.4	26.39	0.000**
Married	4	50.0	38	77.6	34	66.7		
Divorced	2	25.0	2	4.1	2	3.9		
Widowed	2	25.0	1	2.0	0	0.0		
Education								
Not read or write	4	50.0	5	10.2	0	0.0	52.54	0.000**
Read and write	3	37.5	3	6.1	0	0.0		
Basic education	1	12.5	3	6.1	0	0.0		
Secondary education	0	0.0	30	61.2	44	86.3		
University education	0	0.0	8	16.3	7	13.7		
Monthly income								
Enough and saving	0	0.0	4	8.2	9	17.6	16.80	0.002*
Enough only	1	12.5	32	65.3	31	60.8		
Not enough	7	87.5	13	26.5	11	21.6		

Table (6): Statistically relation between socio-demographic characteristics of the studied laboratory employees and their practices (n=108).

Socio-demographic characteristic	Satisfactory (n=29)		Unsatisfactory (n=79)		X^2	p-value
	No.	%	No.	%		
Age/Years						
< 20	0	0.0	14	17.7	10.418	0.015
20-	7	24.1	22	27.8		
30-	12	41.4	24	30.4		
40+	10	34.5	19	24.1		
Sex						
Male	16	55.2	32	40.5	1.848	0.174
Female	13	44.8	47	59.5		
Residence						
Urban	17	58.6	36	45.6	1.446	0.229
Rural	12	41.4	43	54.4		
Marital status						
Single	2	6.9	21	26.6	6.116	
Married	23	79.3	53	67.1		
Divorced	2	6.9	4	5.1		
Widowed	2	6.9	1	1.3		
Educational level						
Not read or write	4	13.8	5	6.3	20.027	0.000**
Read and write	5	17.2	1	1.3		
Basic education	3	10.3	1	1.3		
Secondary education	16	55.2	58	73.4		
University education	1	3.4	14	17.7		
Monthly income						
Enough and saving	1	3.4	12	15.2	14.245	0.001**
Enough only	12	41.4	52	65.8		
Not enough	16	55.2	15	19.0		

Discussion

The clinical laboratory is a workplace where many occupational hazardous such as chemicals, complex instrumentation, and potential pathogens are encountered on a daily basis. However: the laboratory can be a safe place to work and learn if possible hazards are

identified; safety and infection control protocols are followed. Education of health care professionals about the general prevalence, risk of transmission, and availability of prophylaxis and treatment is imperative. Knowledge related to the importance of taking basic precautions through the use of gloves, gowns, and masks has been proven to decrease exposure incidents elsewhere, and should also prove to be effective in Egypt **(Tahira et al., 2020).**

Regarding studied laboratory employees' socio-demographic characteristics of the, the current study revealed that; about one third of the studied laboratory employees aged 30 years or more with mean and standard deviation 32.25±5.07, more than half were female**.** These results disagreed with **Asaad et al. (2020)** who studied "Knowledge and attitudes towards Middle East respiratory syndrome-coronavirus (MERS-CoV) among health care workers in South-Western Saudi Arabia" (n=820), and found that; more than (35.6%) aged 20 years or more, and (55.9%) were female.

Regarding to educational level of the studied laboratory employees, the present study revealed that more than two third had secondary education, half of them lived in rural areas and monthly income was enough for more than half of them**.** These findings were in the same line with **Mahmoud & Sabry (2019),** who studied "Safety training program for clinical laboratory workers regarding prevention of occupational hazards" (n=100), and reported that 42% had secondary education, 67% were living in rural areas, and 42% monthly income enough for them. This might due to secondary education is the main previous education for laboratory technician. This might be due to low opportunity of work in rural area.

In relation to marital status, the current study demonstrates that, more than two thirds of the studied laboratory employees were married. This result was in agreement with **Thirunavukkarasu et al. (2021**) who conducted a study about "Prevalence and Risk Factors of Occupational Health Hazards among Health Care Workers of Northern Saudi Arabia" (n = 438), and found that the majority of the studied sample were married. This might be due to about one third of the studied laboratory employees aged from 30 to less than 40 years old.

Regarding the laboratory workers categories according to their nature of job. The present study revealed that; slightly more than half were laboratory technician, more than one third of them had less than five years of experience. These results were in the same line with **Boyacı et al. (2021)** who studied **"**Laboratory Employees' Perception of Occupational Risk Factors, Turkey" (n=234), and found that more than one third were laboratory technician.

As regards number of courses; about two fifth of the studied laboratory employees received two courses, according to the place of these courses the majority of the studied laboratory employees received the courses outside the hospital. These results agreed with **Annan (2017)** who conducted a study about "Occupational Hazards and Safety Practices among Hospital Workers at Greater Accra Regional Hospital, Ridge, Ghana" (n=246) and reported that more than half of the studied laboratory workers received less than 3 courses, according to the place of courses more than half of the studied laboratory workers taken the courses outside the hospital. This might be due to the studied laboratory employees were completely unaware of lab safety knowledge and biosecurity practices and needed education about personal safety, appropriate handling and lab safety measures to prevent lab hazards inside the hospital.

The current study revealed that; slightly more than half of the studied laboratory

employees had received infection control courses. This finding disagreed with **Al-Abhar et al., (2017)** who studied "Knowledge and Practice of Biosafety among Laboratory Staff Working in Clinical Laboratories in Yemen" (n=362) and reported that less than one fifth of the studied sample had biosafety manual. This might be due to laboratory safety measures training of the laboratory employees is critical for the proper and appropriate management of laboratory safety measures.

Concerning daily working hours of the studied laboratory employees. The current study revealed that more than three fifth of them worked for 6 hours/day. This result disagreed with **Sheshi & Agbana, (2019)** who studied **"**Prevalence of Occupational Diseases and Practice of Safety Control Measures Among Health Workers of General Hospital Minna" (n=300) and found that more than half of the studied sample worked for more than 8 hours. This might due to the policy of the Department.

The results of the current study clarified that slightly less than half of the studied laboratory employees had good total score of knowledge regarding occupational health hazards and its preventive measures, less than half of them had average knowledge and less than one fifth had poor knowledge. This finding was disagreed with **Asaad et al. (2020)** who reported that slightly less than half of the studied sample had poor knowledge regarding occupational health hazards. This might be attributed to their longer years of experiences.

The result of the present study revealed that; studied laboratory employees' total practices scores slightly less than three quarters of them had unsatisfactory practices regarding prevention of occupational health hazards. This result unsupported by **Ağalar & Engin, (2020)** who reported that; 73.5% of them had satisfactory practices regarding laboratory safety measures. This might be due to high knowledge will translate to good practices.

The current study revealed a highly statistically significant relation between total knowledge scores of the studied laboratory employees and their total practices scores regarding prevention of laboratory hazards ($P < 0.001$). This result agreed with **Mahmoud & Sabry (2019),** who reported that a highly significant statistical difference between total knowledge scores of the studied laboratory workers and their total practices scores regarding prevention of laboratory hazards ($P<0.001$). This might be due to the level of knowledge directly reflected on the level of practices among laboratory employees.

The current study revealed that; there were high statistically significant relation between the studied laboratory employees' total knowledge scores and their sex, marital status, and educational level (P value 0.001). These results were in the line with study conducted by **Annan (2017),** who reported that sex, and educational level of the study participants were high statistically significant associated with knowledge and awareness of occupational hazards and safety.

The current study revealed that; there were highly statistically significant relation between total practices score of the studied laboratory employees and their educational level, and monthly income (P value <0.001). These results agreed with **Al-Abhar et al., (2020),** who studied "Occupational exposure to needle stick injuries and hepatitis B vaccination coverage among clinical laboratory staff in Sana'a, Yemen" and found that there was highly statistically significant relation between total practices score of the studied laboratory employees and their educational level.

Conclusion:

Regarding laboratory employees' knowledge and practices, slightly less than half of the studied laboratory employees had good total knowledge regarding occupational health hazards and its preventive measures and more than two third of the studied laboratory employees had unsatisfactory total practices' score regarding prevention of occupational health hazards, and there was a highly statistically significant correlation between total knowledge and practices' scores of the studied laboratory employees regarding occupational health hazards. ($p<0.001$).

Recommendations

1. Develop and implement educational programs to increase knowledge and practice of laboratory employees regarding occupational health hazards and its preventive measures.
2. Continuous training courses about occupational health hazards should be provided for Benha laboratory employees to improve their knowledge and practices.
3. Booklets should be available at laboratory departments and distributed to all laboratory employees about occupational health hazards and its preventive measures.

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الإجراءات الوقائية بين الموظفين فى المختبرات بالمستشفي فيما يتعلق بمخاطر الصحة المهنية

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ممارسات موظفى المختبرات بالمستشفى لاجراءات السلامة والصحة المهنية ضرورية للوقاية والحد من مخاطر الصحة المهنية. لذلك هدفت هذه الدراسة الي تقييم الاجراءات الوقائية بين الموظفين فى المختبرات بالمستشفى فيما يتعلق بمخاطر الصحة المهنية. وقد أجريت الدراسة فى أربعة أقسام مختبرية بالمستشفيات وهى مستشفى بنها الجامعى, مستشفى الحميات, مستشفى التعليمى و مستشفى التأمين الصحى. حيث كشفت النتائج عن اقل من نصف موظفى المختبر لديهم معرفة جيدة بمخاطر الصحة المهنية و اقل من ثلاثة ارباع موضفي المختبر لديهم ممارسات غير مرضية فيما يتعلق بالوقاية من مخاطر الصحة المهنية. كما أوصت الدراسة انه يجب توفير دورات تدريبية مستمرة حول تدابير السلامة في المختبرات لموظفي المختبر.