

## Knowledge and Practice of Restaurants' Workers Regarding Occupational Health Hazards and Safety Measures at Assiut University Restaurants

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### Abstract

**Background:** The restaurant sector considers one of the most rapidly developing sectors in the world. The incidence rate of occupational injury is the highest in restaurants, making it the most dangerous occupation. **Aim of the study:** assess workers' knowledge and practice regarding occupational health hazards and safety measures in restaurants. **Subjects and Methods:** Descriptive cross-sectional design was used. A convenient sample of 806 workers has participated. **Tool 1:** an interview questionnaire sheet was developed and collected by the researchers, it included three parts, **Part one:** personal characteristics, **Part two:** an observational checklist to assess restaurant environment conditions. **Part three:** knowledge questionnaire about occupational health hazards. **Tool 2:** an observational checklist to assess workers' practices toward using safety measures in restaurants. **Results:** The majority of the studied workers had insufficient knowledge and they didn't use the protective measures during their working. **Conclusion:** There was a positive statistical significant difference between workers' knowledge and their educational level, as well as a positive correlation was found between workers' knowledge and their practice toward using safety measures. **Recommendations:** Health education programs should be developed and implemented for restaurant workers to increase their awareness about occupational health hazards and safety measures.

**Keywords:** *Knowledge, Occupational health hazards, Practice, Restaurant, & Safety measures.*

### Introduction

Occupational health refers to identifying and controlling the risks caused by physical, chemical, and other workplace hazards to create and maintain a safe and healthy working environment. These hazards may include chemical agents and solvents, heavy metals as lead and mercury, physical agents as loud noise or vibration, and physical hazards from electricity or dangerous machinery (The National Institute of Environmental Health Sciences, 2019). The restaurant sector considers one of the most rapidly developing sectors in the world. Restaurants employ a large number of people, and there is evidence that the restaurant industry has a high rate of occupational injuries and diseases. (Jahangiri et al., 2019).

According to the International Labor Organization (ILO), 2.3 million employees worldwide die each year as a result of work-related accidents and diseases. Among the manufacturing industries, the food and beverage industries have the greatest risk of occupational injury, making it the most dangerous occupation. (Tezera et al., 2017).

Workers in the restaurant continuously use sharp and dangerous equipment to process various raw materials. In the meat processing industry, sharp and heavy butcher knives are used to cut and trim meat,

which can be greasy and unstable on the cutting board. The floor surfaces of meat processing plants can also be dangerously slippery due to dropped animal fats. Workers in certain branches high risk for inhaling a heavy concentration of dust particles, which can cause respiratory problems and allergies (Kim, 2016).

Occupational hazards are workplace factors with a potential for harm in terms of injury or ill health. They are classified into five categories: physical (noise, radiation, extremes of temperature, etc), ergonomic (mechanical), chemical (solid, liquid, and vapors), and biological (bacteria, viruses, etc), and psychosocial (psychological and social stressful factors). Exposure to any of these hazards can lead to occupational diseases and work accidents (Omoijiade, 2018).

Occupational injury results from a work-related event or a single impulsive exposure in the workplace. There are many risks and hazards in restaurants caused by a combination of the workplace, job, and worker characteristics that contribute to injuries. Typical injuries included musculoskeletal injuries, cuts, lacerations, scalds, burns, and eye injuries. The most common causes of accidents in kitchens are slips and trips, manual handling of heavy loads, exposure to hot surfaces and steam, injuries when

moving articles and hot containers and hand tools, exposure to direct fire, and electrical shock (Bindu & Reddy, 2016).

Occupational health nurses play a vital role in preventing occupational injury and disease through a comprehensive proactive occupational health and safety policy. Also, contribute to the promotion of health and workability, by focusing on non-occupational, workplace preventable conditions that, while not caused directly by work, may affect the employees' ability to maintain attendance or performance at work, through a comprehensive workplace health promotion strategy. They can also contribute to broader public health goals by enhancing environmental health management. (Tiwari et al., 2014).

### Significance of the study:

In Egypt, the number of work-related injuries increase up to 14.3 thousand cases in 2018, compared to 13.5 thousand cases in 2017, an increase of 827 cases, or 6.1%. Cairo recorded the largest number of cases of work injuries, reaching 3834 cases, or 26.7%, followed by Giza with 2504 cases, or 4.17%, while «New Valley» recorded the lowest number of cases of work injuries, where 6 cases, or 0.04% of The total number of cases (The Central Agency for Public Mobilization and Statistics, 2018).

Also, restaurant workers are exposed to a variety of work-related diseases and injuries, however, few significant studies are showing the magnitude of the problem in Egypt. Therefore, paying attention to the problems and work-related diseases of restaurant workers can help the economic growth of the country.

### Aim of the study: -

Assess workers' knowledge and practice regarding occupational health hazards and safety measures in restaurants.

### Research questions: -

- 1- What is the workers' knowledge regarding occupational health hazards and safety measures in restaurants?
- 2- What is the workers' practice regarding occupational health hazards and safety measures in restaurants?

### Subjects and Methods:

#### Research design:

A descriptive cross-sectional research design was used in the current study.

#### Setting:

The present study was conducted in Assiut university restaurants which included fifteen restaurants that divided into ten restaurants for boys (A, B, C, H, D, W, S, Z, O, and sector building), two restaurants for girls (the old L building and the new L building), one

restaurant in each of the following place (faculty of art, central restaurant, and administrative building restaurant).

#### Sample:

Convenient samples were used in this study. The total number of workers in all Assiut University restaurants is 806 workers.

#### Tool of the study:

After reviewing related literature two proper tools were used for data collection:

**Tool (I):** An interviewing questionnaire was developed by the researchers after intensive reviewing related literature for data collection which included three parts as the following.

**Part 1:** Personal characteristics of the workers such as age, sex, level of education, years of experience, type of employment, medical history, and health problem.

**Part 2:** Observational checklist to assess restaurant environmental condition, it included cleanness of the floor, ventilation, lighting, food equipment's, utensils, sewage disposal, waste disposal, and fire extinguishers (Ahmed,2003).

**Part 3:** knowledge questionnaire which developed by the researcher after reviewing the related literature, it was included questions about the definition of occupational health hazards, types of occupational hazards, health problems facing the workers related to occupational hazards as musculoskeletal, respiratory, vision, skin problems and accident facing the workers as burns, falling, wounds or trauma and fractures (Ercan & Kiziltan,2014, Gupta& Bisht, 2019).

#### The scoring system:

A scoring system was designed for the assessment of knowledge which consisted of 15 questions,48 marks, a score of 1 grade was given for each correct answer and a score of zero was given for incorrect answer and don't know. The score of each item was summed-up and then converted into a percent score. (The total score of knowledge was calculated by mean score). (Abd Elzaher et al, 2018).

**Tool (II):** A modified observational checklist to assess workers' practices toward using safety measures in the restaurants as a protective device, presence of mask, apron, gloves, and handwashing (Maseko, 2016)

#### The scoring system:

A scoring system was designed to assess workers' practices which consisted of 11questions, 11marks, a score of 1 grade was given for each done and a score of zero was given for not done answers.

#### Validity of tool:

The tools were designed in English form and reviewed to ascertain their content validity by Jory of five expertise in community health nursing, Assiut University, who reviewed the tool for clarity,

relevance, comprehensiveness, understanding, and applicability.

**Reliability of tool:**

Reliability was applied by the researchers for testing the internal consistency of the tools and the value of Cronbach's Alpha reliability was 0.852 for knowledge and 0.736 for practices toward using safety measures in the restaurants.

**Methodology:**

**Administrative design:**

An official letter of approval was obtained from the Dean of the faculty of nursing at Assiut University to the Vice President for Environmental Affairs and then send to restaurant managers in all Assiut University restaurants. This letter included permission to carry out the study and explained the aim and nature of the study.

**Pilot study:**

The pilot study was carried out before starting data collection on 10 % of restaurant workers about 80 workers; who were included in the sample. It aimed to test the clarity feasibility and estimate the time required to fill the questionnaire.

**Data collection:**

**Ethical consideration:**

The study was approved by the ethical committee in the Faculty of Nursing, Assiut University. Verbal consent was obtained from all participants. Study participants' privacy and confidentiality

were considered during the collection of the data. Participants have the freedom to withdraw from the study at any time and without any rationale.

**Field work:**

An explanation of the purpose of the research was done to directors of restaurants and the researcher gave the directors of each setting a copy of the official letter. Also, the purpose of the study was explained to studied workers to gain their cooperation before starting data collection. Oral consent was obtained also from the participants. The researcher started to collect data from the second week of October 2020 to the end of December 2020 (11 weeks) the total number was 806 workers.

An interviewing questionnaire filled by the researcher. Filling of questionnaire taken to (15-20) minutes. The data was collected in (three days/ week) with an average number of 26-27 workers /day.

**Statistical analysis:**

Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as numbers, percentages, mean, and standard deviation. Independent samples t-test was used to compare quantitative variables between two groups and ANOVA test was used for more than two groups. Pearson correlation was done to measure the correlation between quantitative variables. P-value considered statistically significant when  $P < 0.05$ .

**Results:**

**Table (1): Distribution of studied restaurants' workers regarding to their personal characteristics (n= 806).**

Personal characteristics	No. (806)	%
<b>Age: (years)</b>		
< 40	314	39.0%
40 – 50	327	<b>40.5%</b>
> 50	165	20.5%
Mean ± SD (Range)	41.89 ± 9.52 (18.0-59.0)	
<b>Gender:</b>		
Male	526	<b>65.3%</b>
Female	280	34.7%
<b>Educational level:</b>		
Illiterate	55	6.8%
Read and write	83	10.3%
Primary school	142	17.6%
Preparatory school	86	10.7%
Secondary school	396	<b>49.1%</b>
University education	44	5.5%
<b>Marital status:</b>		
Single	91	11.3%
Married	687	85.2%
Divorce	11	1.4%
Widow	17	2.1%
<b>Residence:</b>		
Rural	315	39.1%
Urban	491	<b>60.9%</b>

**Table (2): Distribution of studied restaurants' workers according to their career history (n= 806).**

Variables	No. (806)	%
<b>Type of restaurant task: #</b>		
Cooking	104	12.9%
Waiters	<b>331</b>	<b>41.1%</b>
Preparing the food	151	18.7%
Washing tools	252	31.3%
Food packaging	9	1.1%
<b>Years of experience:</b>		
< 10	249	30.9%
10-15	241	29.9%
> 15	<b>316</b>	<b>39.2%</b>
<b>Previous work before joining to the restaurant:</b>		
Yes	382	47.4%
No	<b>424</b>	<b>52.6%</b>
<b>If yes answer the following: (n=382)</b>		
<b>Duration of work: (years)</b>		
< 5	145	38.0%
5 – 10	<b>195</b>	<b>51.0%</b>
> 10	42	11.0%
<b>Health problems during the pervious of work: (n=382)</b>		
Yes	23	6.0%
No	<b>359</b>	<b>94.0%</b>
<b>Smoking:</b>		
Smoker	<b>365</b>	<b>45.3%</b>
Non-smoker	441	54.7%
<b>Regular medical examination of the restaurant staff:</b>		
Yes	766	95.0%
No	40	5.0%
<b>Duration of medical examination: (n=766)</b>		
Every 6 months	18	2.3%
Every year	748	97.7%
<b>Examination before joining the job:</b>		
Yes	611	75.8%
No	195	24.2%
<b>Vaccination against food borne diseases:</b>		
Yes	<b>19</b>	<b>2.4%</b>
No	787	97.6%
<b>Training courses on occupational safety and health:</b>		
Yes	31	3.8%
No	<b>775</b>	<b>96.2%</b>

# There is more than one task

**Table (3): Distribution of restaurants' workers as regard to their knowledge about occupational health hazards in restaurant (n= 806).**

Variables	No. (806)	%
<b>Definition of occupational health hazards:</b>		
Correct	198	24.6%
Incorrect	608	<b>75.4%</b>
<b>Physical hazards:#</b>		
Don't know	161	20.0%
Exposure to high temperature	<b>431</b>	<b>53.5%</b>
Lighting (weak-strength)	30	3.7%
Dust exposure	9	1.1%
Noise	333	41.3%
<b>Chemical hazards:#</b>		
Don't know	533	66.1%
Gases	249	30.9%
Both	2	0.2%
Chemical liquids	22	2.7%
<b>Biological hazards:#</b>		
Don't know	684	<b>84.9%</b>
Viruses	103	12.8%
Bacteria	36	4.5%
Parasites	3	0.4%
<b>Environmental hazards:#</b>		
Don't know	119	14.8%
Stand for a long time	578	71.7%
Cook a large amount of cereals and vegetable	18	2.2%
Both	91	11.3%
<b>Health risks:#</b>		
Don't know	92	11.4%
Burns	<b>515</b>	<b>63.9%</b>
Wounds	136	16.9%
Thermal stress	52	6.5%
Fainting	331	41.1%
Fractures	278	34.5%
<b>Psychological hazards:#</b>		
Don't know	376	46.7%
Fear and anxiety	103	12.8%
Insecurity	22	2.7%
Stress	380	47.1%
<b>Diseases that are transmitted through food:#</b>		
Don't know	<b>720</b>	<b>89.3%</b>
Hepatitis (A)	35	4.3%
Typhoid and paratyphoid	13	1.6%
Salmonella	18	2.2%
Diarrhea	65	8.1%

# There is more than one answer

**Table (4): Distribution of studied restaurants workers as regard to their knowledge about health problems in restaurants (n= 806).**

Variables	No. (806)	%
<b>Musculoskeletal problems: #</b>		
Don't know	195	24.2%
Joint pain	298	37.0%
Back pain	502	<b>62.3%</b>
Varicose legs	63	7.8%
Muscle contraction	47	5.8%
<b>Skin problems: #</b>		
Don't know	584	72.5%
Red skin	190	23.6%
Skin irritation	57	<b>7.1%</b>
Skin itching	3	0.4%
<b>Respiratory problems: #</b>		
Don't know	579	<b>71.8%</b>
Sneeze	143	17.7%
Cough	87	10.8%
Cold	39	4.8%
Bronchitis	16	2.0%
Asthma	6	0.7%
Pneumonia	7	0.9%
<b>Vision problems: #</b>		
Don't know	514	63.8%
Redness and inflammation in the eye	192	23.8%
Sensitivity of the eye	24	3.0%
Poor vision	136	<b>16.9%</b>

# There is more than one answer

**Table (5): Observational checklist of the food serving restaurants in Assuit University (n=15).**

Variable	Total No. (15)	Percent (%)
<b>Floor type:</b>		
Ceramic	14	<b>93.3%</b>
Tiled	1	6.7%
<b>Floor cleaning:</b>		
Clean	6	40.0%
Not clean	9	<b>60.0%</b>
<b>Covered with an easy-to-clean, non-slip insulating material:</b>		
Yes	0	0.0%
No	15	100.0%
<b>Smooth surfaces, free of cracks:</b>		
Yes	4	26.7%
No	11	<b>73.3%</b>
<b>Equipped with a wastewater filter:</b>		
Yes	12	80.0%
No	3	20.0%
<b>Does it smell bad?</b>		
Yes	1	6.7%
No	14	<b>93.3%</b>
<b>Wall painting:</b>		
Available	15	100.0%
Not available	0	0.0%

Variable	Total No. (15)	Percent (%)
<b>Type of paint:</b>		
Oil	1	6.7%
Faience	0	0.0%
Plastic	0	0.0%
Ceramics	14	93.3%
<b>The roof condition:</b>		
Intact and free of cracks	12	80.0%
Cracked	3	20.0%
<b>Clean of the roof:</b>		
Clean	10	66.7%
Unclean	5	33.3%
<b>Ventilation outlets#</b>		
Windows	15	100.0%
Air conditioning	2	13.3%
Suction	14	<b>93.3%</b>
<b>Ventilation devices are clean and in good condition:</b>		
Yes	6	40.0%
No	9	60.0%
<b>Is there a wire in the windows?</b>		
Yes	14	93.3%
No	1	6.7%
<b>Type of lighting:</b>		
Natural & Artificial	15	100.0%
<b>Is it enough?</b>		
Yes	1	6.7%
No	14	93.3%

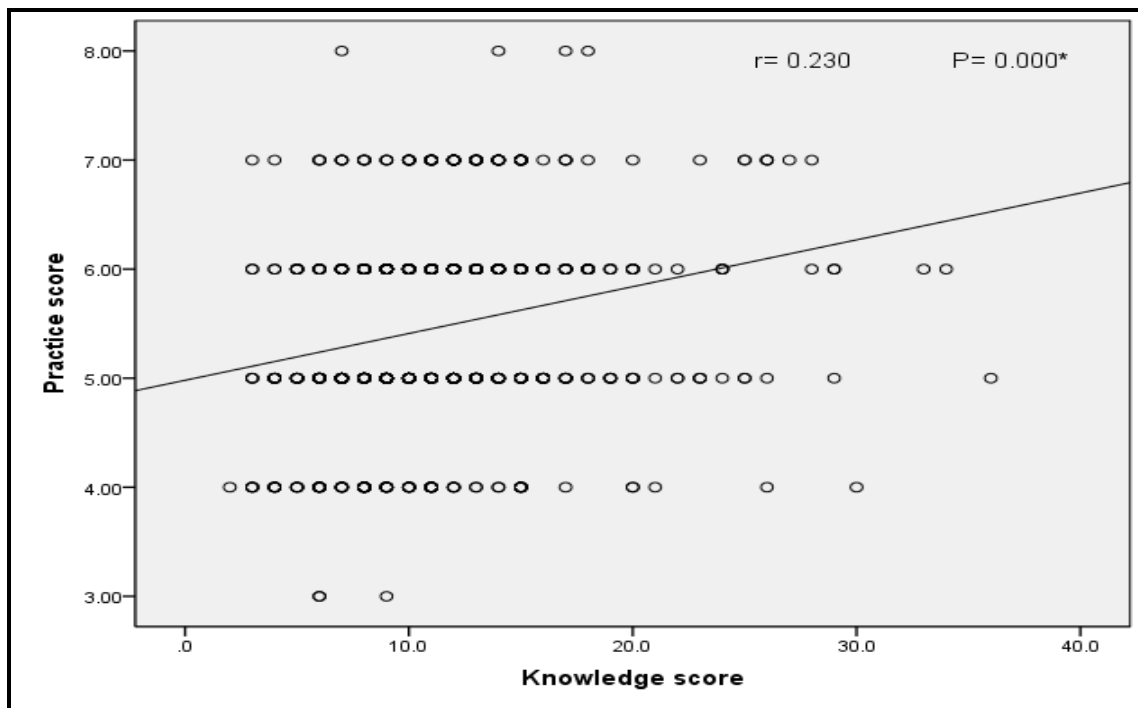
**Table (6): Distribution of studied restaurants' workers as regard to their practice about safety measures in restaurants (n= 806).**

Variables	Done		Not done	
	No.	%	No.	%
Hand washing	619	76.8%	187	23.2%
Wearing appropriate gloves	164	<b>20.3%</b>	642	79.7%
wearing appropriate apron	369	<b>45.8%</b>	437	54.2%
wearing appropriate mask	47	<b>5.8%</b>	759	94.2%
wearing the overhead	25	3.1%	781	96.9%
All gas cylinders secured	798	99.0%	8	1.0%
Sharp tools stored safely	772	95.8%	34	4.2%
Use a sharps container for broken glass	11	1.4%	795	98.6%
The cleaning store readily accessible and fully stocked	790	98.0%	16	2.0%
Existence of trained person in first aid at the workplace	8	1.0%	798	99.0%
Use fire extinguishers in the workplace	801	<b>99.4%</b>	5	0.6%

**Table (7): Relationship between a score of knowledge of the studied workers and their personal characteristics in the restaurant (n= 806).**

Personal data	Knowledge score		P-value
	Mean ± SD	Range	
<b>Age: (years)</b>			
< 40	10.33 ± 4.18	3.0-29.0	
40 – 50	12.08 ± 5.06	3.0-36.0	0.000*
> 50	11.35 ± 4.35	2.0-30.0	
<b>Gender:</b>			
Male	11.31 ± 4.97	2.0-36.0	0.591
Female	11.13 ± 4.00	3.0-29.0	
<b>Educational level:</b>			
Illiterate	9.98 ± 2.94	5.0-22.0	
Read and write	12.25 ± 5.04	3.0-29.0	
Primary school	10.64 ± 3.96	4.0-30.0	0.000*
Preparatory school	11.16 ± 4.23	3.0-29.0	
Secondary school	11.05 ± 4.69	2.0-36.0	
University education	14.89 ± 6.14	5.0-33.0	
<b>Marital status:</b>			
Single	9.53 ± 3.18	3.0-18.0	
Married	11.47 ± 4.78	2.0-36.0	0.002*
Divorce	10.27 ± 1.95	7.0-13.0	
Widow or widower	12.06 ± 5.46	5.0-25.0	
<b>Years of experience:</b>			
< 10	10.53 ± 4.98	3.0-33.0	
10-15	11.08 ± 3.70	3.0-26.0	0.001*
> 15	11.94 ± 4.94	2.0-36.0	

\* Statistical significant difference ( $P < 0.05$ ).



**Figure (1): Correlation between total knowledge scores about occupational health hazards and total practice scores toward using safety measures among restaurant workers (n= 806).**



**Table (1):** Illustrates the distribution of studied restaurants' workers regarding their personal characteristics, it was found that 40.5% of studied workers, their ages ranged between 40- 50 years. The mean age  $\pm$  SD (Range) was  $41.89 \pm 9.52$ . Regarding gender, it was observed that 65.3% were male. In addition, the table illustrates that 49.1% of studied workers had secondary education. Also, it was observed that 60.9% of workers are from urban areas.

**Table (2):** Show distribution of studied restaurants' workers according to their career history. It was found that 77.5% of restaurants workers was worked in the morning and 41.1% of them were waiters. According to years of experience, the table represented that 39.2% of restaurants' workers were more than fifteen years. Also, the table showed that 51.0 % of workers worked from 5-10 years. Concerning smoking and vaccination, it was found that 45.3% and only 2.4% of workers were a smoker and vaccinated respectively. The present table shows that 96.2% of studied workers didn't have previous training in occupational safety.

**Table (3):** Shows the distribution of restaurants' workers as regard to their knowledge about occupational hazards in the restaurant, it was clear that 75.4% of restaurants' workers don't know the definition of occupational health and 53.5% of them mentioned high temperature as physical hazards, Also the table presents that 63.9% of studied workers considered burn as health risks in restaurants' environment. Moreover, 47.1% of studied workers stated stress as a psychological hazard. Furthermore, 89.3% of them didn't know diseases transmitted through food.

**Table (4):** Illustrates distribution of studied restaurants' workers as regarding to their knowledge about health problems in the restaurant. It was noticed that 62.3% of restaurants workers mentioned back pain as a musculoskeletal problem. As regard to skin problems, it was observed that only 7.1% of the studied workers concerning skin irritation. Moreover, the current table shows that 71.8% & 16.9% of studied workers don't know respiratory problems and stated poor vision respectively.

**Table (5):** Shows observational checklist of the food serving restaurants, it was found that 93.3% was formed from ceramic. In addition, it was found that 60.0% of restaurants' floors were unclean. Regarding the smoothing of the surfaces, it was observed that 73.3% of surfaces weren't smooth and free of cracks and 93.3% of the restaurants were painted by ceramic. Regarding ventilation, it was observed that windows were present in all places and 93.3% of the restaurants had suction. In addition, the table clear that both natural and artificial lighting ware exists in

all restaurants and they were not enough in 93.3% of all the places.

**Table (6):** Illustrates the distribution of studied restaurants' workers as regard to their practice regarding safety measures in restaurants, the table clears that 20.3% of studied workers wearied appropriate gloves and 45.8% of them wearied appropriate aprons. Regarding wearing an appropriate mask, it was observed that only 5.8% of the studied workers wearied masks. Also, current results show that about 99.4% of the studied workers used fire extinguishers in the workplace.

**Table (7):** Illustrates that there was a statistically significant difference between the score of knowledge of the studied workers and age, educational level, marital status, and years of experience P value (0.000, 0.000, 0.002 and 0.001) respectively.

**Figure (1):** Showed that there was a positive correlation between total Knowledge score about occupational health hazard and practice score toward using safety measures among restaurant workers with significant  $r = 0.230^*$   $p = 0.000^*$

### Discussion:

Restaurants workers are in danger of a wide range of occupational hazards, including falls, slips, burns, high temperatures, long-standing, heavy workload, walking long distances, carrying heavy burdens in awkward postures and inadequate rest are the factors influencing the increase of musculoskeletal disorders prevalence among the kitchen workers, (Jeong, 2015) & (Elsayed, 2017).

The present study aimed to assess workers' knowledge and practice regarding occupational health hazards and safety measures in restaurants.

Regarding to workers' age, the present study showed that slightly about two-fifth of studied workers, their age ranged between 40- 50 years. The mean age  $\pm$  SD (Range) was  $41.89 \pm 9.52$ .

These results agreed with Elsayed, 2017 who conducted a study in Benha city about the effect of educational intervention about work-related musculoskeletal disorders on restaurant workers in Toshiba Alarabi factories and he found that the age of the studied workers ranged between 40-<50 years, with a mean age  $40.4 \pm 10.1$  years.

On the other hand, these results are inconsistent with Ercan & Kiziltan, 2014 who conducted a study about practices and knowledge of food handlers in Istanbul, Turkey and they found that the mean age of the food handlers was  $35.8 \pm 9.78$  years.

As regard to workers' gender, the present study showed that the vast majority of studied workers were males. This result can be explained by the nature of work very hard, heavy, and requires physical effort

due to the large size of cooking utensils in the restaurant to cover the students' needs.

The present study was in the same line with **Afube et al., 2019** who conducted a study in Nigeria about the assessment of hazards and safety practices in the food and beverage industry and who found that the vast majority of the workers were males. On the other hand, these results disagreed with **Ercan & Kiziltan, 2014** who reported that more than half of workers were men.

According to workers' educational level, the current study showed that about half of studied workers had a secondary educational level, while less than fifth of them was a primary school. This impacts their knowledge of the hazards from their occupation, use of personal protective equipment, and benefits of proper hygienic practices. Moreover, statistically significant differences were observed between workers' knowledge with their education  $P = (0.011^*)$ . On the other hand, these results disagreed with **Ajambo, 2013** who conduct a study in Kampala district about adherence to occupational safety and health measures by employees in selected restaurants and he found that more than two third of studied workers had secondary education.

Moreover, the current results disagreed with **Ercan & Kiziltan, 2014** who revealed that around half of the studied workers were graduated from the primary school and only 3.3% of them had university education. Moreover, a statistical significant relationships were found between education level, and the kitchen safety knowledge of food handlers ( $p < .05$ ).

According to marital status, the present study showed that the majority of the studied workers were married. Also, there was a statistical significant difference between workers' level of knowledge and their marital status  $p = (0.022^*)$ .

The current study was similar to **Ercan & Kiziltan, 2014** who found that the majority of participant workers were married. There were significant relationships between marital status and the kitchen safety knowledge of food handlers ( $p < .05$ ).

As regard to the type of work, the current results revealed that near one fifth of the studied workers performed cooking tasks and two fifth of workers were waiters.

The present results were in contrast with **Tegenu et al., 2021** who conduct a study in Northwest Ethiopia about self-reported work-related musculoskeletal disorders and associated factors among restaurant workers in Gondar city and they found that more than one fifth of studied workers was involved in cooking tasks and one third of them were waiters.

On the other hand, the present results confronted with **Carayanni et al., 2011** who conduct a study in

Greece about covariates of occupational accident occurrence in the restaurant sector and they found that more than one third of workers were waiters and nearly one third of them were cooking.

According to years of experience in the restaurant, the present study showed that about two fifth of the studied workers had more than fifteen years of experience and less than one third of them had 10-15 years of experience.

Moreover, the current study showed that there was a statistically significant difference between years of experience with their knowledge as well as their practice  $p = (0.001^*, 0.000^*)$  respectively. This may be explained by normal consequences that exist by prolonged working years there is an increase in workers' knowledge and practices about occupational health hazards and safety precautions.

On the other hand, these results disagreed with **Jahangiri et al., 2019** who conduct a study in the South of Iran about self-reported, work-related injuries and illnesses among restaurant workers in Shiraz city and they found that more than one third of the studied workers had 1-5 years of experience in restaurants.

In addition, the present study contrasted with **Carayanni et al., 2011** who reported that more than one third of the studied workers had years of experience in restaurants greater than ten years, and near to one fifth of them had working experience less than one year in the restaurants.

According to the habits of the studied workers at the restaurant, the present results showed that near half of workers reported smoking cigarettes. This may be explained by the pressure of work which makes workers escape the stress by smoking.

The present results disagreed with **Tegenu et al., 2021** who reported that almost all of the restaurant workers were nonsmokers.

In addition, these results were incompatible with **Kokane & Tiwari, 2011** who conduct a study in India about occupational health problems of highway restaurant workers of Pune and they found that one third of the studied workers were cigarette smoking.

According to immunization against foodborne diseases, the present study showed that only (2.4%) of the studied workers had vaccinations against food-borne diseases.

The present results were in confronted with **Kokane & Tiwari, 2011** who reported that none of the studied workers had prophylactic immunization.

As regard to workers training about occupational safety and health practices, the current results revealed that most of the studied workers didn't have training programs about occupational health and safety measures in restaurants, but they gain their information by experience. From the researcher's

point of view, this may be due to there being a shortage of training personnel who are qualified to give a training course in occupational health and safety practices.

This result agreed with **Jahangiri et al., 2019** who reported that two fifth of the studied workers stated that they had not been trained regarding occupational safety and health standers.

The current results are incompatible with **Tegenu et al., 2021** who found that more than one third of the studied workers take training courses about occupational safety and health practices.

These results were consistent with **Tiwari, 2015** who conduct a study in India about situational analysis of occupational health issues of restaurant and dhaba workers and found that none of the studied workers have received any training on occupational health and safety.

Concerning knowledge of the studied workers about the definition of occupational health, the results of the current study showed that about three quarter of the studied workers didn't know the definition of occupational health because the restaurant workers didn't have sufficient training programs about occupational health hazards and safety measures.

As regard to knowledge about health risks among restaurant workers, the study results showed that more than three fifth of the studied workers stated burn and more than one third mentioned fracture related to slippery floors.

The current study was conflicted with **Gupta& Bisht, 2019** who conducted a study in Punjab state about awareness and incidents of occupational health hazards among female workers of small scale food processing units and they found that all of the studied workers were aware of the occupational health hazards related to their jobs such as burns, cuts, and falls/slips.

In addition, the current study demonstrated that slightly more than half of the studied workers mentioned exposure to high temperatures as a physical hazard and one third of them stated gases as chemical hazards in the restaurant. Also, the majority of them didn't know the biological hazards that may be present in the restaurant environment. These results may be explained by the lack of proper health education programs in the restaurant, which focused on increasing workers' knowledge about occupational health hazards that may be the effect their health.

On the other hand, the present study was inconsistent with **Abdullahi et al.,2021** who conduct a study in Nigeria about critical assessment of occupational health hazards in the hospitality industry in Kano state and they found that more than three quarters of the studied workers had knowledge about physical work hazard and about half of them were aware about

biological hazards occur in the establishment. In addition, more than half of the studied workers knew about chemical hazards.

Concerning knowledge of the studied workers about diseases that are transmitted through food, the results of the current study showed that the majority of the studied workers didn't know these diseases, the minority of them stated diarrhea and only 4.3% of them mentioned hepatitis A. Lack of enough knowledge about the diseases transmitted by foods may be due to low education level of the workers and that they didn't receive enough training.

Moreover, the current study agreed with **Ali et al., 2018** who conduct a study in Sultanate Oman about food safety knowledge among food workers in restaurants of Salalah municipality and they found that all of the studied workers thought that diarrhea was with no tiny doubt is transmitted by food.

On the other hand, the present study contrasted with **Nwamaka, 2016** who conduct a study in Nnewi urban about assessment of food safety knowledge and practices among food handlers in restaurants and found that the majority of the studied workers were aware of foodborne diseases.

Moreover, these results disagreed with **Hemati & Fadaei, 2020** who conduct a study in Iran about knowledge, and practice among food workers in restaurants of shahrekord and they found that half of the studied workers mentioned diseases transmitted through food.

According to workers' knowledge about health problems in restaurants, the study results showed that about two third of them stated back pain, while only 0.4% of them mentioned skin itching. In addition, near one fifth of studied workers stated sneezing and only 0.7% mentioned asthma as a respiratory problems and more than one fifth of them stated inflammation of eyes from vision problems.

The present study disagreed with **Gupta& Bisht, 2019** who reported that all of the studied workers had knowledge about back and muscle pain, eye irritation, and one fifth of studied workers had a prevalence of asthma.

As regard to characteristics of building construction of the food serving restaurants. The present study showed that about three fifth of restaurants' floors were unclean and the majority of them had insufficient lighting.

The present study results agreed with **Elsersy et al., 2018** who found that about two thirds of university kitchens had an insufficient design in both shifts as infrastructure needs some development, poor ventilation, and lightening due to improper distribution of both windows and doors.

These results were in accordance with **Bertin et al., 2009** who conduct a study about hurdles at work

perceptions of hospital food handlers and they reported that the examined hospital kitchens had unhealthy environmental conditions with high temperature, high humidity due to poor ventilation, kitchens exist in the restricted area. All these conditions increased the probability of errors and had harmful effects on food workers.

Regarding to workers' practice about safety measures. The present study revealed that about more than three quarter of the studied workers washed hands before handling equipment and food, one fifth of them wearing gloves, only 5.8% of the studied workers wearing the mask, and more than two fifth wearing apron before working.

The present results are supported with **Asmawi et al., 2018** who carried a study about assessment of knowledge, attitudes, and practices in food safety among food handlers engaged in food courts and they found that about fourth fifth of the studied workers washing hands.

The current study was in the same line with **Nwamaka, 2016** who found that the majority of the studied workers didn't use gloves during food preparation.

The present results are confronted with the results reported by **Hemati & Fadaei, 2020** who reported that more than one fifth of studied workers wears a mask while working.

The results of the present study disagreed with **Asmawi et al., 2018** who reported that slightly more than two fifth of the studied workers wearing gloves before working. In addition, the majority of them wear an apron and more than one third of workers wear a mask while working.

The result of the present study differs from that recorded by **Elsersy et al., 2018** who carried a study in Egypt about the assessment of food safety in hospital kitchens in Tanta city Gharbia governorate and they found that about half of food handlers in university kitchens used disposable gloves and overhead. This could be due to a lack of supervision, financial resources, and lack of knowledge of workers to wear working clothes.

The present study revealed a positive correction between total knowledge score about occupational health hazard and practice score toward using safety measures in a restaurant with significant  $r = 0.230^*$   $p = 0.000^*$

These results agreed with **Shah et al., 2014** who conduct a study in Hayatabad Peshawar about assessment of knowledge about occupational hazards and utilization of safety measures among the industrial workers and they report that a positive correlation was found between knowledge, attitude and practice.

### Conclusion:

The study concluded that there was a positive statistical significant difference between workers' knowledge and their educational level, as well as a positive correlation was found between workers' knowledge and their practice toward using safety measures.

### Recommendations:

The study recommended that health education programs should be developed and implemented for restaurant workers to increase their awareness about hazards and safety measures.

- Having visual instructions about occupational safety on the walls of restaurants should be useful.
- First aid supplies and personal protective equipment should be available in the workplace.
- Need further studies about occupational health hazards at restaurants on a larger sample.

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