# Health Educational Program For Food Handlers About Food Safety In Port Said Hospitals

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# ABSTRACT

Background: Food handlers could be a source of nosocomial foodborne outbreaks since they could contaminate food at any point from purchase to distribution. It is essential to ensure that food handlers receive training on safe food handling practices. Aim: To evaluate the effect of health education for food handlers about food safety in Port Said hospitals. Subjects and Method: A quasi-experimental design was used. Subjects: A purposive sample of 59 food handlers dealing with food production, preparation, and storage in hospital's kitchens. Setting: The study conducted at all hospitalists' kitchens which affiliated to the healthcare hospitals in Port said. **Tools:** Three tools were used for data collection; the first tool Food Handlers questionnaire, the second tool Food Safety Attitude Point Rating Scale, the third tool Observational food handlers' practice checklist. In addition to the personal and sociodemographic data sheet. The Results: 69.5% of the food handlers had good knowledge level postprogram compared to 13.6% pre-program. 76.3% of them had positive attitude level post-program compared to 44.1% pre-program. 67.8% of them had good practice level post-program compared to 16.9% pre-program. in addition, there was statical significant positive correlation between the food handlers' knowledge, attitude, and practice post-program. Conclusion: The health educational program effect positively on food handlers' knowledge, attitude, and practice about food safety. Recommendations: Design additional studies about safe food handling for food handlers in other hospitals in Egypt.

*Keywords*: Emotional intelligence, marketing, nursing profession, nursing students.

# **INTRODUCTION**

Foodborne diseases are a major cause of morbidity and mortality and a major public health problem worldwide. It is caused by consuming contaminated foods or beverages. Many different disease-causing microbes or pathogens can contaminate foods, so there are many different types of foodborne illnesses. Most foodborne diseases are infections caused by a variety of bacteria, viruses, and parasites. Other diseases are poisonings caused by harmful toxins or chemicals that have contaminated food (Chen, et al., 2023). Worldwide, the consumption of contaminated food or water results in 600 million infections (7.7% of the world's population) and 420,000 deaths every year. Additionally, foodborne diseases pose a huge economic burden. The lost productivity and medical costs associated with this type of infection are more than US\$ 110 billion per year in low- and middle-income countries (Tomé, et al., 2023).

Food handler is anyone who works in a food business that handles food, works with surfaces that are likely to be in contact with food such as cutlery, plates and bowls. A food handler may do many different things for a food business such as making, cooking, preparing, serving, packing, displaying and storing food. Food handlers can also be involved in manufacturing, producing, collecting, extracting, processing, transporting, delivering, thawing or preserving food (Alemayehu, Aderaw, Giza, & Diress, 2021). Proper handling and industrial processes may include cooking at the right internal temperature to prevent undercooked meat, preventing cross- contamination through proper segregation to prevent contact, storing foods at proper refrigeration temperatures, and other critical control points that help render potential infectious diseases ineffective (Zandonà et al., 2021).

Food safety refers to the proper food handling procedures applied during food preparation, processing, storage, and distribution of the products you deal with in your food business. It is a basic need but there is a danger that it may be overlooked in the development of effective and efficient processes. It remains a critical issue with outbreaks of foodborne illness resulting in substantial costs to individuals, the food industry and the economy (Kamboj et al.,2021). The five keys to safer food's main take aways including keep things clean, keep raw and cooked food separate,

cook fully, maintain food at a safe temperature, and use safe water and raw materials. The poster's message about food hygiene is being disseminated around the world in more than 40 different languages (Ehuwa, Jaiswal, & Jaiswal, 2021).

Given the presence of "consumers" (hospitalized patients at risk), who are frequently more vulnerable than healthy subjects, food cleanliness is especially important in hospitals to decrease the risks of food poisoning. The majority of food handlers in hospital caring are members of the food-services personnel, while nurses and other domestic workers may also distribute or serve meals. Hospital food service personnel could be a source of nosocomial foodborne outbreaks since they could theoretically contaminate food at any point from purchase to distribution (Ehuwa, et al., 2021).

Health education program implementation for food handlers, distribute clear guidelines for food service staff when suspected food-borne illnesses occur. Furthermore, implement hospitals health policies and procedures for the management of gastrointestinal diseases or food poisoning, promote prevention alertness and focus on safe food and hand washing behaviors and Provide food precautions by implementing food safety program (WHO, 2021).

The community health nurse has a major task in raising awareness of public health regarding food safety, prevention and control of unsafe food especially at hospitals. Also, the community health nurse can evaluate patients and food handlers having gastrointestinal signs and symptoms and document findings, identify potential cases of food illness and follow up with patients, and food handlers as needed (WHO, 2021).

# Significance of the study

Adequate amounts of healthy and safe foods are important to maintain life and promote good health (WHO, 2015). About 30 million Egyptians are infected with dangerous diseases due to contamination of water, food and environment, this made Egypt one of greatest countries affected by diseases, which always raise a number of questions about what the Egyptian citizens are eating foods that meet the necessary conditions for health and safety (Saad, 2018).

There are few studies about food handler and food safety in Port Said. So, this study aims to evaluate the effect of health educational program for food handlers about food safety in Port Said hospitals

# The study aimed to

Evaluate the effect of the health educational program for food handlers about food safety in Port Said hospitals.

# Objectives

- 1. Assess of the existing knowledge of food handlers about food safety in Port Said hospitals.
- 2. Identify attitude of food handlers about food safety in Port Said hospitals.
- 3. Estimate practices of food handlers regarding food safety in Port Said hospitals.
- 4. Design health education for food handlers about food safety in Port Said hospitals.
- 5. Implement health educational program for food handlers about food safety in Port Said hospitals
- 6. Find out the effect of the health educational program on food handlers regarding food safety in Port Said hospitals.

# **Research Hypothesis:**

Food handlers' knowledge, attitude and practices regarding to food safety will be statistically significantly improve after implementation of the health educational program.

# SUBJECTS AND METHOD

# A. Technical design:

This design includes a description of the research design, setting of the study, subjects, and tools of data collection.

# Study design:

A Quasi-experimental research design (one group pre and post-test) was utilized to meet the aim of this study.

# **Study setting:**

The study was conducted at all hospitalists' kitchens affiliated to Healthcare Authority hospitals in Egypt (in Port Said city). It included five hospitals as: (Alsalam Hospital, Alnasr Hospital, Mogamaa Elshefaa altteby, Obstatric and gynecological Hospital, and Alzohor specialized Hospital).

# **Subjects**

The study involved all working personnel dealing with food production, preparation, and storage in hospital's kitchens affiliated to Healthcare Authority hospitals in Port Said city (in previous setting). A purposive sample of 59 food handlers who agreed to participate in the study and present during the time of data collection were recruited in the study.

# **Tools for data collection:**

Three tools were used for data collection:

Tool (I): Food Handlers questionnaire: The questionnaire was divided into three parts

# The first part: Demographic characteristics:

This part was developed by the researcher to obtain information about demographic characteristics of the respondents: age, gender, educational level, income level. Occupational profile including: type of job, work shift, working hours per day, duration of employment, contact type, food handling license.

# The second part: Food Handlers Questions:

This part was adopted by (fadaei, 2015) in English language and translated by the researcher into Arabic language. It consisted of 15 questions to cover the knowledge about food hygiene. Questions on knowledge referred to the four food safety factors: Food borne diseases (5 items) such as: (proper cleaning and handling of instruments reduces food contamination); Personal hygiene (4 items) such as: (washing hands before work reduces food contamination) Temperature control (3 items) such as: (the correct temperature for refrigerator is 4-7C) and Cross contamination and food handling practices (3 items) such as: (Hepatitis A can be transmitted by food).

**Scoring system:** The response was analyzed as categorical variable (correct or in correct answer). A score of 1 was given to correct answer (yes) and 0 to the incorrect answers (no or I don't know). The total score of knowledge was converted to percentage and used to categorize them as done by (Robin & khalilir, 2016) as follows:

- Poor knowledge (equal or less than 50%).
- Fair knowledge (51 to 70%).
- Good knowledge (70% and above).

# Third part: Reported Hygienic practices of food handlers:

This part was adopted by Rohin and Khalilir (2016) in English language to evaluate hygienic practices of food handlers. It consisted of 25 reported practices referred to main hygienic practices; Wearing personal protective clothes and equipment (apron- hair restraint- footwear – mask-gloves (6 items) such as: (food handler wear clean clothing and cover it with apron). Personal hygiene (nails-wearing jewelers-covering wounds- hand drying- coughing- sneezing, smoking near food (8 items) such as: (worker sneeze or cough near foods). Hand washing practices (11 items) such as: (employee follow proper hand washing procedure (wash hands often with soapy water for 20 seconds before handling food).

**Scoring system:** The response analyzed as categorical variable (yes / no). A score of 1 given to correct practice and 0 to incorrect practice, items 9, 10, and 11 are reversed items. Total score range of hygienic practice is between (0-25). The total score of hygienic practice converted to percentage and used to categorize them as done by (Rohin & Khalilir, 2016), as follows:

- Poor hygienic practice (equal to less than 50%).
- Fair hygienic practice (51 to 69%).
- Good hygienic practice (70% and above).

# Tool (II) Food Safety Attitude Point Rating Scale:

Food safety attitude scale was adopted by Dedeler (2009), It was included 10 statements; each related to food handlers' attitudes toward food safety handling.

**Scoring system:** Respondents was asked to indicate their level of agreement to the statements using a three-point rating scale (2= agree, 1 uncertain and, 0 disagree). Total score range of attitude was between (0-20). The total score of attitudes was converted to percentage and was used to categorize them as done by (Rohin & Khalilir, 2016) as follows:

- Negative attitude (less than 60%).
- Positive attitude (equal 60% and above).

### Tool (III): Observational food handlers' practice checklist:

The observational checklist was divided into two parts:

#### First part: Food handling observations of food workers checklist:

This part was adopted by (Kiziltan, 2014). It has been designed to evaluate food handling practices of food workers. It consisted of 7 items checklist as follows:

- Cleaning small equipment and utensils between uses.
- Using proper utensils during preparation or packing food to minimize bare hand contact.
- Cleaning food contact surfaces between uses and keeping cooked food covered in clean containers.
- Keeping cooked food covered in clean food grade container.
- Placing cooked food at least 60cm above the floor to protect from contamination.
- Touching RTE (Ready to Eat) foods with bare hands.
- Contacting food when suffering from disease as diarrhea, cold or skin diseases.

**Scoring system:** The response analyzed as categorical variable correct or incorrect practice (done or not done). A score of 1 given to correct practice and 0 to incorrect practice, items 6, and 7 are reversed items. Total score range of hygienic practice is between (0-7). The total score of hygienic practice will be converted to

percentage and will be used to categorize them as done by (Rohin & Khalilir, 2016) as follows:

- Poor hygienic practice (equal to less than 50%).
- Fair hygienic practice (51 to 69%).
- Good hygienic practice (70% and above).

# Second part: Observational checklist for food handlers' infection control practices:

This part includes checklist adopted by World Health Organization (2020). Was designed to assess food handlers' adherence to standards of two types: hand washing (16 items), and wearing protective clothes (24 items) before and immediate after the training sessions implementation.

**Scoring system:** Items were rated using two-point rating scale (1 done and, 0 not done).

The total score will be converted to percentage and will be used to categorize them as follows:

- Poor: <50% (< 5 scores).
- Average: 50% to <75% (from 5 to <7.5 scores).
  - Good:  $\geq$  75% ( $\geq$  7.5 scores).

# **B-** Operational design:

The operational design of this study includes preparatory phase, tool validity, pilot study, reliability and fieldwork:

# **Preparatory Phase:**

Extensive review of the current national and international related literatures, and theoretical knowledge of various aspects of the study using books, articles, internet periodicals and magazines in order to develop the data collection tools.

# **Tools' validity:**

Tools of data collection are tested for content validity by a panel of five experts

in the field of Family and Community Health Nursing in Faculty of nursing Port Said University. It is conducted to test the tools for appropriateness, comprehensiveness, relevance, and clearance. Their opinions are elicited regarding the tool format, layout, and consistency. The necessary modifications are done accordingly.

#### **Tools' reliability:**

The reliability is assured by calculating Cronbach's  $\alpha$  Coefficients. Its value is (0.79), which indicates high reliability.

#### **Pilot Study:**

The pilot study was carried out before data collection phase with 10 % of study sample which included (6) food handlers, who were selected randomly from the aforementioned hospitals. It was done to ascertain the relevance, clarity & applicability of the developed tool and to estimate the time needed to fill questionnaires sheets. Those food handlers who shared in the pilot study not excluded from the study sample and were chosen from the main study sample as a result of the modifications made to the questionnaire sheet, where some of the questions were added and others were omitted and rewording. The final form of the tool was formulated and the time needed for completing them was also determined.

#### Field work:

The study is implemented through the following four phases: assessment, program planning, implementation, and evaluation. Collection of the data covered a period of eight months from 1st of November 2021 until the end of June 2022.

#### Phase I: Assessment (Pre-test phase)

After preparing the tool, the study sample was recruited. This was followed by collecting baseline data. Pre-tested questionnaire was administered to the study sample to study their existing level of knowledge, attitude and practice regarding food safety and foodborne diseases. Data collected from the food handlers were performed during work breaks. The hospitals were visited four days in week from the beginning to the end of the work (morning shift + afternoon shift).

The study sample divided into 13 small groups of 3-6 members in each group. The researcher introduced herself to the food handlers and took the consent of them to be recruited in the study after explaining the aim of the study, then the researcher interviewed food handlers and distributed the questionnaire sheet to them. During the interview, the researcher reads each item/question on a data collection sheet and explained its meaning. Then the food handlers were asked to write down their answers. Each sheet lasted about 30- 45 minutes to be filled. Pre-test phase lasted two months. Confidentiality of all collected information was strictly assured.

#### **Phase II: Program planning**

Based on the information obtained from initial assessment, in addition to literature, the researcher designed the educational program under the guidance of the supervisors. Its main aim is to improve knowledge, attitude, and practice of the food handlers about food safety in Port Said hospitals. A booklet was developed for food handlers, which covered all items related to food health safety and foodborne diseases. The educational program contains the following: (Overview regarding food and food safety, Foodborne diseases (Definition, types, causes, signs and symptoms, factors affecting disease, complication, modes of transmission, prevention, and management), Vulnerable groups for foodborne diseases, Food safety (definition, steps, training measures about food safety), personal hygiene, hand washing procedure and wearing personal protective equipment (PPE), Health guidelines about food safety.

The educational program is written in a simple Arabic language with different illustrated color pictures to enhance the learning process and facilitate food handlers' understanding. After developing the booklet, it was revised by a panel of five experts in the field of Family and Community Health Nursing Port said University.

### Phase (III): Program implementation

The educational program was carried out in the five previous mentioned hospitals affiliated to the Health Care Authority in Egypt in Port Said City. For interviewing food handlers, the researcher depended on coordination with the hospitals directors in gaining information about food handlers' days and times of work. In addition, coordination was done with food handlers' supervisors to enable the researcher to interview them. The researcher was collected pre-test data for two months before conducting implementation phase that lasting for three months. The tools sheets were filled in about 30 minutes to 45 minutes. Then, the participants were divided into 13 small groups, two days for each group as the following:

- Mogamaa Alshefaa Altteby hospital include 20 food handlers divided into 4 groups each group include 5 food handlers.
- Alsalam hospital include 17 food handlers divided into 3 groups each group 5-6 food handlers.
- Alnasr hospital include 10 food handlers divided into 2 groups each group 5 food handlers.
- Alzohor central hospital include 6 food handlers divided into 2 groups each group include 3 food handlers.
- Obstetrics and gynecology hospital include 6 food handlers divided into 2 groups each group include 3 food handlers.

At the beginning of the first session, an orientation to the aim of the study and the goals of the program took place. Also, food handlers were oriented about the phases of the study and the program sessions (time, duration, place, and contents). The researcher stressed on the importance of continuous attendance and active participation. Every session lasted average of 3-4 hours (one hr. for theory and 2-3 hrs. for practice and redemonstration).

Each session started with a summary of the previous session and objectives of the new session, using a very simple language that suits the level of food handlers without ignoring motivation and reinforcement techniques. Different teaching and learning methods were used during the sessions which included; interactive lecture, group discussion, demonstration & re- demonstration, instructional media included data show, pictures, blackboard and printed booklet. The program was presented in a clear and concise form to be used as memorial reference.

Direct reinforcement in the form of a copy from the educational booklet was given as a reward for each food handler to use it as a future reference. Food handlers were allowed to ask any interpretation, elaboration or explanation of any item included in the sessions. The total program implementation was 12 months (two weeks permission to carry out the study, two weeks pilot study, two months to carry out pre-test, six months for implementation and post-test, three months data entry statistical analysis and data interpretation).

#### **Phase IV: Evaluation**

After implementation of the program, the post-test has done to evaluate the effect of the program after one month of the program implementation using the same tool which is used in the pre-test. Pre-test phase lasted for two months; the researcher observed practice of the studied food handlers by using the third tool after one month of the implementation of the educational program.

#### **C-** Administrative design

Permission to carry out the study from the responsible authorities was obtained. Before conducting the study, official letter is submitted from Faculty of Nursing Port Said University to the directors of the aforementioned hospitals, to obtain their approval to carry out the study. At the time of data collection, a verbal agreement is taken from every participant in the study after clear and proper explanation of the study purpose and its importance for them.

#### **Ethical considerations:**

The study was approved by the Research Ethics Committee (REC), Faculty of Nursing/ Port Said University with (code number: NUR7/2/2021) (26) based on the standard of the committee, Faculty of Nursing, Port Said University. The aim of the study was explained to directors of each hospital and the food handlers before asking them to participate in the study. Stressing on confidentiality of the collected information. The researcher emphasized that the participations was absolutely voluntary and each food handler had the right to withdraw from the study at any time with no questions asked, as well as confidentiality was assured. The process of data collection was not disturbing the harmony of the work.

#### **D.** Statistical design

Data are fed to the computer and analyzed using IBMSPSS software package

version 20. Qualitative data are described using numbers and percent. The reliability (internal consistency) test for the questionnaires used in the study was calculated by Cronbach's  $\alpha$  coefficient test. The chi-square test (or Fisher's exact test when applicable) was used for comparison of variables with

categorical data. A significant level value was considered when the p-value  $\leq 0.05$ . Student's t- test was used to measure differences between the pre-test and post-test.

### RESULTS

**Table 1:** The results shows that 62.7% of the studied sample were in age group of 30 - 39 years old with mean  $37.8 \pm 5.6$ , and 57.6% of them were male. Regarding educational level, 71.2% had secondary level, and 33.9% are working in Mogamaa Elshefaa Eltteby hospital. Concerning smoking status, 74.6% reported they don't smoke. 76.3% of the studied sample mentioned their income not enough, and all of them live in urban area. Furthermore, 44.1% their experience range 15 - 20 years with mean 16.9  $\pm$ 5.2. Also, the table clarifies that 100% had training courses about quality, infection control, OSHA. Regarding type of work 44.1% were cooking. Also 100% of the studied sample done the pre-employment examination, periodic medical examination, license to work as food handler and receiving vaccines.

**Figure 1:** reflects the food handlers' total score of knowledge level regarding food safety pre and post-program, as observed in the figure 69.5% of the studied sample had good knowledge in post-program compared to 13.6% pre-program with strong statistically significant differences (p= 0.001).

**Figure 2:** displays the food handlers' total score of attitude level regarding food safety pre and post–program, observed in the figure 76.3% of the studied sample had positive attitude level post-program compared to 44.1% pre-program with strong statistically significant differences (p= 0.001).

**Table 2:** indicates total score of food handlers practice among the studied sample pre and post- program. Concerning personal hygiene, as noted from the table 71.2% of the studied food handlers had good practice level post-intervention compared to 15.3% pre-program with strong statistically significant differences (p= 0.001). 66.1%

of the study sample had good practice level post-program compared to 16.9% preintervention with strong statistically significant differences (p=0.001).

**Figure 3:** presents the food handlers' total practice regarding food safety pre and post program, it is obvious that 67.8% of the studied sample had good practice post-program compared to 16.9% pre-program with strong statistically significant differences (p= 0.001).

**Table 3:** Indicates total practice regarding of infection control precautions pre and post- program. Concerning hand washing, as noted from the table 79.7% of the studied sample had good practice post-program compared to 20.3% pre-program with strong statistically significant differences (p= 0.001). Concerning wearing personal protective equipment, 78% of them had good practice post-program compared to 23.7% pre-program with strong statistically significant differences (p= 0.001).

**Table 4:** shows that there was statical significant positive correlation between the food handlers' knowledge, attitude, and practice, post-program r= 0.294, r= 0.375, and r= 0.375 respectively.

# **Table 1**: Distribution of the studied sample regarding their sociodemographiccharacteristics (n= 59).

Items	Ν	%
Age (Years)		
30-40	37	62.7
40 - 50	22	37.3
Mean ±SD	37.8 ±5.	6
Gender		
Male	34	57.6
Female	25	42.4
Education		
Preparatory	4	6.8
Secondary	42	71.2
University	13	22.0
Hospital		
Obasteric & Gynecological	6	10.2
Mogamaa – Elshefaa	20	33.9
Al-zohour	6	10.2
Al-salaam	17	28.8
Al-nasr	10	16.9
Current smoking status		•
Yes	15	25.4
No	44	74.6
Income		
Not enough	45	76.3
Enough	14	23.7
Residence		
Urban	59	100.0
Experience (Years)		
< 15	20	33.9
15 - 20	26	44.1
> 20	13	22.0
Mean ±SD	16.9 ±5.	.2
Receiving food safety training courses	59	100.0
Types of courses		
Quality	59	100.0
Infection Control	59	100.0
OSHA	59	100.0
Working hours Per day		
12 Hours	59	100.0
Work shift		
Two shifts (morning and afternoon).	59	100.0

<b>Table 1:</b> Cont. Distribution of the studied sample regarding their sociodemographic
characteristics $(n = 59)$ .

Items	Ν	%					
Type of work in the kitchen							
Store workers	7	11.9					
Preparing	15	25.4					
Cooking	26	44.1					
Cleaning	11	18.6					
Receive pre-employment examination							
Yes	59	100.0					
Periodic medical examination		-					
Yes	59	100.0					
the frequency of medical examination							
Yearly	59	100.0					
License to work as food handler		-					
Yes	59	100.0					
Receive any vaccines		1					
Yes	59	100.0					
Types of vaccine							
Hepatitis B	24	40.7					
Corona	26	44.1					
Flu	29	49.2					
Number of doses							
Hepatitis B (2 Doses)	16	27.1					
Hepatitis B (3 Doses)	43	72.9					
Corona (2 Doses)	16	27.1					
Corona (3 Doses)	43	72.9					
Flu (one dose yearly)	59	100					



Figure 1: Total score level of knowledge regarding food safety pre- and post-program



Figure 2: The relation between total score attitude of food handlers about food safety pre and post–program

**Table 2:** Relation between total score practices of food handlers among the studiedsample pre and post- program (n= 59).

	Pre- program		Post- program		Chi – Square			
	Ν	%	N	%	X <sup>2</sup>	Р		
Personal Hygiene								
Poor hygiene	32	54.2	7	11.9				
Fair hygiene	18	30.5	10	16.9	39.664	<0.001**		
Good hygiene	9	15.3	42	71.2	-			
Mean ±SD	10.5 ±4.3		17.4 ±4.8		8.224#	<0.001**		
Food Handling Practices								
Poor practice	33	55.9	10	16.9				
Fair practice	16	27.2	10	16.9	30.850	<0.001**		
Good practice	10	16.9	39	66.2	-			
Mean ±SD	3.8 ±1	.3	5.5 ±2	2.2	5.110#	<0.001**		

#: student's t – test



Figure 4: The total practice score of food handlers regarding food safety pre and post–program.

	Pre-program		Post-program		Chi – Square			
	n	%	N	%	X2	Р		
Hand washing steps								
Poor practice	26	44.1	3	5.1				
Fair practice	21	35.6	9	15.3	43.804	<0.001**		
Good practice	12	20.3	47	79.7				
Mean ±SD	10.3 ±2.3		13.2 ±4.3		4.567#	<0.001**		
Wearing personal protective equipment								
Poor practice	25	42.4	5	8.5				
Fair practice	20	33.9	8	13.6	25 5 42	.0.001**		
Good practice	14	23.7	46	78.0	35.542	<0.001**		
Mean ±SD	17.2 ±5.2		23.5 ±4.9		6.772 <sup>#</sup>	<0.001**		

# **Table 3:** Distribution of the food handlers' total practice regarding of infection control precautions (n= 59)

**Table 4:** Correlation matrix between Knowledge, Attitude and Practice scores.

	Knowledge		A	ttitude	Practice				
	R	Р	r	Р	R	р			
Pre-intervention									
Knowledge			0.055	0.678	0.190	0.151			
Attitude	0.055	0.678			0.149	0.261			
Practice	0.190	0.151	0.149	0.261					
Post-intervention									
Knowledge			0.414	< 0.001**	0.294	0.024*			
Attitude	0.414	< 0.001**			0.375	< 0.001**			
Practice	0.294	0.024*	0.375	< 0.001**					

# DISCUSSION

Food safety has become an important issue for public health in several nations. Food safety, as stated by the World Health Organization (WHO), is the set of circumstances and precautions that must be taken throughout the preparation, production, processing, preservation, and delivery of food to be able to make sure that it is wholesome, safe, and fit for people's consumption (Mohammed, Abuzaid, & Hassan, 2023). On the other hand, food handlers may contaminate food by malpractices linked to a lack of knowledge about the basics of food safety, including personal hygiene, proper cooking and storage temperature, and cross-contamination (Al-Akash, et al., 2022). This knowledge can be enhanced by training of food safety in safe food handling. A training program of food safety is a widely used strategy to improve food safety knowledge (Addo-Tham, et al., 2020).

This study was directed to evaluate the effect of health educational program for food handlers about food safety in Port Said hospitals. To discuss this finding, the present study focused on knowledge, attitude, and practice. The findings of this study generally indicate poor knowledge about food safety handling pre-program phase. While, there is marked improvement post- progrm in knowledge, attitude, and practice among the studied sample.

According to the studied food handlers' knowledge about food safety, the findings of the current study displayed that there was remarkable improvement in the studied sample' knowledge post-program with strong statistically significant differences. From the researcher point of view, the obvious and remarkable improvement of the current study because there are many different teaching and learning methods and using good media, they were interested and motivated due to their level of education ,food safety is their main work and have pre-experience about food safety, could be attributed to the effect of implemented educational program, which designed tailored to the studied food handlers' needs that covering all information required for the studied group.

This result was in the same line with a previous study in Qatar by Elobeid, Savvaidis, and Ganji, (2019) which entitled impact of food safety training on the knowledge, practice, and attitudes of food handlers working in fast-food restaurants they found that pre-training food handlers had poor knowledge on proper cleaning of equipment, cross-contamination, foodborne diseases, food danger zone and correct procedures for thawing of frozen food which enhanced after training implementation. Also, Hassan, ElBagoury, Amin, Meky, and Galmal (2022) who conducted study entitled development and assessment of health education program regarding food safety among food handlers at Ain Shams university hospitals in Egypt and reported that there was an improvement in food safety knowledge scores immediately post, and follow-up after 3 and 6 months after intervention, they noticed that only 13.3% of the studied food handlers had good knowledge pre-program which enhanced to 76% of them had good knowledge after 6 months of program implementation.

Regarding to food handlers' attitude, the present findings demonstrated that more than half of the studied sample had negative attitude about food safety preprogram which improved to more than three quarters of them had positive attitude about food safety post- program with strong statistically significant differences. This can be indicated that the educational program was effective in achieving its objective regarding improvements of the studied sample' attitude. This may be due to usage of teaching aids such as the distributed hand out that contains more information about food safety in attractive way.

Similar results were obtained by Madilo, Letsyo, and Klutse, (2023) who conducted study on food safety knowledge, attitude and practices among food handlers in tertiary and second circle institutions in Ghana and found that attitude level among the studied food handlers was raised post implementation of training about safe food handling and asserted that trainings in food safety is very important instrument for improving knowledge, practice, and attitude of food handlers. Also, Al-Akash, Arrah, Bhatti, Maabreh, and Arrah (2022) in Italy who studied the effect of food safety training program on food safety knowledge, practices and attitude in hospitals' food services and revealed that there was significant improvement in food handlers' attitude regarding safety food handling training.

As regard to total score of practice among the studied food handlers, the present study findings illustrated that more than half of the studied food handlers had poor total practice pre- program which improved to more than two thirds of them had adequate practice post- program. This result in harmony with Hassan, et al. (2022) who clarified that there was a statistically significant difference in food safety practice scores when comparing food safety practice scores pre intervention with post intervention scores.

Regarding to the studied sample practice of hand washing, the current study results elaborated that there was significant improvement in practice scores postintervention with strong statistically significant differences. This was most evident in rinse hands under running water, and move the soap between fingers and hands. This result agreed with Wahdan, Gad, Habib, and Elshazly (2019) which entitled effect of an educational program on food safety practices in food preparation and handling procedures in governmental hospitals in Egypt and found that during washing hands, most of food handlers missed the webs between the fingers and missed their finger nails before implementation of the educational and improved post-program implementation. In addition, Mohamed, et al. (2020) who revealed that the mean scores of food handlers' practice concerning hand washing were significantly increased after implementation of the educational guidelines.

Concerning to the studied sample practice of wearing personal protective equipment (PPE), the current study results demonstrated that there was significant improvement in practice scores post-program with strong statistically significant differences. From the researcher's point of view, it could be due to their past experience about infection control precautions as all the studied sample had acquired their information regarding infection control from the previous receiving training courses as they mentioned.

These findings in the same line with results of the study conducted by Wahdan, et al. (2019) who stated that the mean scores of personal protective equipment, hygienic practices, cleaning of used equipment showed a significant increase after intervention as well as, all food hygiene practices of their study participants were significantly improved. This finding was agreed with the study conducted by Ahmed, and Sayed (2021) who reported that three-fifths of the study participants received training about safe food handling and infection control. In addition, the study by Taha, Osaili, Vij, Albloush, and Nassoura (2020) which entitled structural modelling of relationships between food safety knowledge, attitude, commitment and behavior of food handlers in Dubai, United Arab Emirates and discovered that three-quarters of the participants received food safety training courses.

The present results of correlation matrix of knowledge, attitude and practice revealed that there was statical significant positive correlation between the food handlers' knowledge, attitude, and practice, post-program. Thus, this proved that the implemented educational program was effective in achieving its objectives. And finally, the overmentioned hypothesis was achieved in which knowledge, behavior, and practice were improved.

These findings in the same association with a previous study conducted by Elobeid, et al. (2019) who reported that there was significant direct association throughout the different criteria of food safety knowledge, attitude, and practice. Furthermore, results of the study by Tamiru, et al. (2022) stated that knowledge of food safety was significantly associated with food safety attitude and practices. While, the present results come to be in contrast with Hassan et al. (2022) in Egypt who stated that there was no correlation between knowledge, attitude, and practices among food handlers at the end of the health education program intervention.

# CONCLUSION

# Based on the findings of the present study, it can be concluded that:

The health educational program effect positively on food handlers' knowledge, attitude, and practice about food safety. It was found that there were statistically significant differences between pre-program and post-program scores of food handlers' knowledge, attitude, and practice levels. In addition, there was significant improvement in food handlers' practice of handwashing and wearing personal protective equipment (PPE) after implementation of the educational program about food safety.

# RECOMMENDATIONS

#### Based on the results of the present study, the following recommendations were

# suggested:

- Before beginning their work responsibilities, newly hired food handlers should complete training classes.
- Providing training courses for new employed food handlers before take their work responsibilities of food handling.
- Regular implementation of educational health programs for food handlers' working in hospital kitchens to improve knowledge.
- Conducting regular training courses to equip food handlers with skills regarding safety food measures.
- Provide regular educational sessions about safe food handling practices.

# For further studies:

- Design additional studies about safe food handling for food handlers in other hospitals in Egypt.

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برنامج تثقيف صحي للمتعاملين مع الغذاء عن سلامة الأغذية في مستشفيات بورسعيد

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# الخلاصة

الكلمات المرشدة: التثقيف الصحى ، المتعاملين مع الغذاء، سلامة الغذاء