

Prevention Program for Foodborne Diseases at Suez Canal University Hospital Restaurant at Ismailia city

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Abstract: Food-borne diseases become of paramount importance in hospitals. Hospitals have been identified as high food safety risk institutions because they serve potentially hazardous foods to vulnerable people. These people are more susceptible to food-borne illnesses than the general population and consequently food contamination by pathogens could be particularly harmful. Aim: To evaluate the effect of health educational program for foodborne diseases prevention at Suez Canal University Hospital restaurant at Ismailia City. Design: A quasi-experimental design was conducted in this study. Setting: The study was conducted at Suez Canal University Hospital restaurant at Ismailia City. Sample: All food handlers in the restaurant of Suez Canal University hospital constituted the study population. The total number of workers in food catering services in the restaurant was 65 workers. All of them were included in this study. Tools: Two tools were used in this study. First tool: A structured interview questionnaire was developed by the researchers and included the following: Socio-demographic data, food handlers' knowledge regarding food safety, food handlers' attitude toward food safety precautions and food handlers' practices related to food safety. Second tool: An Observational Checklist for safety kitchen environment and supplies. The results: The results revealed that, statistically significant ($p < 0.001$) difference between the studied sample mean scores of knowledge, attitude and practices regarding food safety (pre/post) implementing the program. Conclusion: The knowledge, attitude and practices regarding food safety and prevention of foodborne diseases were improved after implementing of the program. Recommendation: It is recommended therefore to conduct regular training courses for all food handlers as part of their continuous education.

Keywords: Food safety, Food preparation, Food handling and prevention of foodborne diseases.

1. INTRODUCTION

Foodborne diseases are a global health issue that has major impacts on human health, it's an infectious or toxic in nature and caused by viruses, bacteria, parasites or chemical substances entering the body through contaminated food or water. Foodborne pathogens can cause severe diarrhea or debilitating infections including meningitis, (WHO, 2020).

CDC estimates that 1 in 6 Americans get sick from contaminated foods or beverages each year, and 3,000 die. The U.S. Department of Agriculture (USDA) estimates that foodborne illnesses cost more than \$15.6 billion each year, (CDC, 2020). Each year worldwide, unsafe food causes 600 million cases of foodborne diseases and 420 000 deaths. 30% of foodborne deaths occur among children under 5 years of age. WHO estimated that 33 million years of healthy lives are lost due to eating unsafe food globally each year, and this number is likely an underestimation, (WHO, 2020).

Multiple and frequent foodborne disease outbreaks indicate food safety as a global public health concern. Foodborne diseases cause morbidity, mortality, and reduced socio-economic development. (CDC, 2017).

Several factors such as the use of contaminated raw materials, contaminated equipment, poor personal hygiene, and failure in monitoring critical control points during processing compromise the quality and safety of foods, (Mahmoud & Sivakumar, 2014). Poor personal hygiene and inappropriate food handling practices have been reported as major causes of food contamination by food handlers, (Baluka et al., 2015).

There was an urgent need to improve food safety knowledge and practices of food handlers and control microbial contamination to enhance the safety and quality of food and eliminate food borne diseases, (*Husain et al., 2016*).

Especially in hospitals, food hygiene requires attention to detail in relation to all preventive measures to minimize the hazards of food poisoning, particularly given the presence of “consumers” (hospitalized patients at risk) who often are more vulnerable than healthy peoples. In hospital catering, food-services staff are the main food handlers, although nurses and other domestic staff may distribute or serve meals. Food-services staff in hospitals represents a potential source of nosocomial foodborne outbreaks, since they may possibly introduce pathogens into foods during every phase from purchase to distribution, (*Elshebinly et al., 2020*).

Occupational health nurse provides for and delivers health and safety programs and services to workers, worker populations and community groups. The practice focuses on promotion and restoration of health, prevention of illness and injury, and protection from work-related and environmental hazards. Occupational and environmental health nurses have a combined knowledge of health and business that they blend with health care expertise to balance the requirement for a safe and healthful work environment with a ‘healthy’ bottom line, (*American Association of Occupational Health Nurses, 2020*).

Moreover, the occupational health nurse (OHN) aims to analyzing each job for to detect the risk situations which place an employee at risk through assessment and surveillance so as to identify the work potential hazards, then reducing risk or minimizing risk problems in addition to giving health education to increase the workers awareness about occupational health hazards and how to protect themselves from its dangers, (*Baron et al., 2014*).

Aim of the study:

The study aimed to Evaluate the effect of health educational program for foodborne diseases prevention at Suez Canal University Hospital restaurant at Ismailia City.

2. SUBJECTS AND METHODS

I. Study Design

A quasi-experimental design was conducted in this study.

II. Setting

The study was conducted at Suez Canal University Hospital restaurant at Ismailia City.

III. Subjects

The subjects of the present study, all food handlers in the restaurant of Suez Canal University hospital constituted the study population. The total number of workers in food catering services in the restaurant was 65 workers. All of them accepted to be included in this study.

IV. Data collection

To fulfill the aim of this study: two tools were used for data collection.

Tool (1): A structured interview questionnaire: A questionnaire sheet was prepared by the researcher for the purpose to assess food handlers’ knowledge, practice and attitude regarding food safety guided by **World Health Organization (WHO, 2015)**, and reviewing of recent literature, which includes four parts to gather the following data:

Part (I):- Socio-demographic Data:-

It was constructed by the researcher and included socio-demographic characteristics of the studied sample such as age, gender, marital status, educational level, years of experience and nature of work.

Part II:- Food handlers ' knowledge regarding food safety: -

It was included questions to assess knowledge of the food handlers regarding the prevention of foodborne diseases, it consisted of the following items :-

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(Cross-contamination prevention/disinfection procedures, separate raw food and cooked food, keep food at a safe temperature and use safe water and safe soft materials,..... etc.)

□ Scoring for knowledge:-

The questionnaire sheet for assess the knowledge regarding food safety and prevention of foodborne diseases among food handlers' were consisted of 48 Q., as true or false questions and the total scores were 48 degrees .

The result categorized as the following:

Zero = incorrect answer 1= correct answer

Summation of all and calculate the mean and standard deviation were computed.

Poor knowledge = 1 - 24 (<50%)

Fair knowledge = 25-37 (50% - 70%)

Good knowledge = 38- 48 (>70%)

Part III: - Food handlers ' attitude toward food safety precautions:-

It was included questions about the attitude of the food handlers toward food safety precautions, it was consisted of the following items -:

(Personal hygiene/keep cleanliness, cross contamination prevention / disinfection procedures, cook the food well, and use safe water and safe soft materials,..... etc.)

□ Scoring for attitude:-

The food handlers' questionnaire sheet for assessment attitudes toward food safety and prevention of foodborne disease consisted of 19 Q., total scores were 38 degrees and every question answered by: Agree (2), Not sure (1) and Disagree (0). Summation of all and calculate the mean and standard deviation were computed.

Part IV: - Food handlers ' practices related to food safety:-

It was included questions about the practice (as they reported) of food handlers regarding food safety precautions, it consisted of the following items:-

(Personal hygiene and preventive measures, clothes and personal hygiene, food preparation and separation, food cooking and reheating, keep food at a safe temperature..... etc.)

□ Scoring for practice:-

The food handlers' questionnaire sheet for assess the practice (as they reported) of food handlers regarding food safety precautions was consisted of 25 Q., always (5), often (4), sometimes (3), rarely (2) and never (1).

Tool (2): - An Observational Checklist for safety kitchen environment and supplies:-

This tool was developed by the **Lebanese Ministry of Public Health, Preventive Medicine Department (2015)**, and used after modification, it consisted of six parts:-

Part I: Food preparation settings: it included 18 questions as: (floors, walls, ceilings, lighting, ventilation, kitchen equipment, doors and windows).

Part II: Food handlers: it included 11 questions as: (Personal hygiene, medical examination and training courses)

Part III: Receiving and preparing food: it included 22 questions as: (receiving and storage of raw materials, Freezing and cooling facilities and prevention of cross-contamination).

Part IV: Cleaning and disinfection: it included 3 questions.

Part V: Sanitary facilities and changing room: it included 13 questions as (Bathrooms, Washbasins and Washing machines).

Part VI: Basic sanitation: it included 17 questions as (water supply, waste management and insect protection)

Those parts were divided into two categories: Safety measures (which consisted of 46 points) and Supplies (which consisted of 39 points).

□ **Scoring system:-**

- The checklist to assess safety measures consisted of 46 items, each item was given two points to make the total scores 92 degrees and the safety measure divided into as follows:- Unsafe = (<50%), Safe = (≥50%).
- The checklist to assess supplies consisted of 39 items, each item was given two points to make the total scores 78 degrees and the supplies with divided into as follows:- Insufficient = (<50%), Sufficient = (≥50%).
- The summation of all and calculate the number and percentage were computed.

V. Operational Design

1. Tools validity

After developing tools and before data collection, the tools were ascertained for clarity, relevance, comprehensiveness, understanding and ease for implementation by a jury of five expertise (four from community health nursing staff faculties and one from occupational medicine). According to their recommendations were modified.

2. Reliability:

Chronbach's alpha test used to measure the internal consistency of tool in this study. The reliability proved to be high with a Cronbach alpha coefficient test which was high for all questionnaires, and suitable for scientific purposes.

3. Pilot Study

The pilot study was carried out after the development of tools and using the Arabic version of the questionnaire before starting the data collection, it was carried out on 7 workers (10 % of the estimated sample) in restaurant to evaluate the feasibility of implementing the designed tools and time required to fill in each tool. The subjects included in the pilot study were excluded later from the study samples.

4. Ethical Considerations

Before conduction of the study, written permission was obtained through official letter from the dean of faculty of nursing, Suez Canal university to General Director of University Hospitals to carry out the study and collect the necessary data from the study subjects. The aim was explained to the food handler's to be familiar with the importance of participation. Promote the confidentiality of data and food handler's freedom to withdraw from the study any time.

5. Field Work

- Approvals: - A written approval was obtained through official letter from the dean of faculty of nursing, Suez Canal university to General Director of University Hospitals to carry out the study and collect the necessary data from the study subjects. The aim of the study explained to the office managers to gain their cooperation during data collection.
- Data collection: - Data were collected from beginning of December 2019 to beginning of March 2020, the actual duration was three months. This was implemented through four phases as namely (Assessment phase, Planning phase, Implementation phase and Evaluation phase).
- The program aim was providing accurate knowledge, attitudes and practices related prevention of foodborne diseases, the teaching methods were carried out through lecture and discussion, while the media was included pamphlet, booklet, video and presentation.
- The researchers met the food handlers at the part from the rest period of working to fulfill the questioners and provide coffee or tea break for them. The purpose of the study was explained to each food handlers to gain their consent and

cooperation before their participation. Then worker's oral consent was obtained before their participation, they were informed about their rights to withdraw from the study at any time and that their answers will not be taken against them, it will be kept confidentially, and will be used just for the purpose of the study.

VI. Statistical methods

Data were collected, tabulated and subjected to statistical analysis. Statistical analysis is performed by using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp), Quantitative data were described using range (minimum and maximum), mean, standard deviation. Significance level is considered at $P < 0.05$ (S); while for $P < 0.01$ is considered highly significant (HS). Two Tailed tests are assumed throughout the analysis for all statistical tests.

3. RESULT

Table (1) Showed that, the mean age of the studied sample was 35.5 ± 9.5 , 76.9 of them were males. Concerning marital status, it was found that 87.6% of the studied sample were married. Regarding the level of education, it was observed that 52.3% of the studied sample were read and write. Regarding years of experience, mean of years was 10.5 ± 8.8 .

Table (2) Demonstrates that, there was statistically significant ($P < 0.001$) difference between studied sample mean scores of knowledge regarding food safety (pre/post) implementing of the program

Figure 1: Portrays that, improvement in the total mean score of attitudes regarding food safety among Food handlers' (Pre/Post) implementing of the program

Table (3) Shows that, there was statistically significant ($P < 0.001$) difference between studied sample mean scores of practices as reported by them regarding food safety (pre/post) implementing of the program

Figure 2: Illustrate that, the restaurant kitchen had safe environment (70.93%), and insufficient supplies (57.97).

Table-4. Shows that, there were statistically significant ($P < 0.001$) relation between knowledge and attitudes, knowledge and practices, attitudes and practices throughout the program

Table-5. Demonstrates that, there were statistically significant ($P < 0.05$) relation between age and overall food handlers' practices throughout the program

Table 1: Distribution of the food handlers according to socio-demographic characteristics (n=65)

Socio-demographic characteristics	No.	%
Age (years)		
Mean \pm SD	35.5 ± 9.5	
Range	(21- 60)	
Gender		
Male	50	76.9
Female	15	23.0
Marital status		
Single	4	6.1
Married	57	87.6
Widow	3	4.6
Divorced	1	1.5
Educational level		
Illiterate	1	1.5
Technical	21	32.3
Reads and writes	34	52.3
High	9	13.8
Type of work		
Cooker	14	21.5
Assistant Cooker	11	16.9
Technician	20	30.7
Dietitian	9	13.8
Supervisor	7	10.7

Other	4	6.1
Years of Experience		
Mean ± SD	10.5±8.8	
Range	(1-33)	

Table 2: Mean scores of Food handlers’ knowledge regarding food safety pre/post program (n=65)

Items	Pre	Post	t	p
	Mean ± SD	Mean ± SD		
Cross contamination prevention / disinfection procedures	13.79±7.63	24.55±4.11	13.443	0.001*
Separate raw food and cooked food	5.03±2.95	7.55±1.31	8.614	0.001*
Cook the food well	1.70±1.10	3.67±0.91	14.603	0.001*
Keep food at a safe temperature	3.94±1.58	6.30±1.56	11.013	0.001*
Use safe water and safe raw materials	1.28±0.63	2.81±0.52	13.727	0.001*
Total knowledge	25.74±12.33	44.88±8.13	14.575	0.001*

t: Paired t-test

p: p value for comparing between the pre and post

*: Statistically significant at $p \leq 0.05$

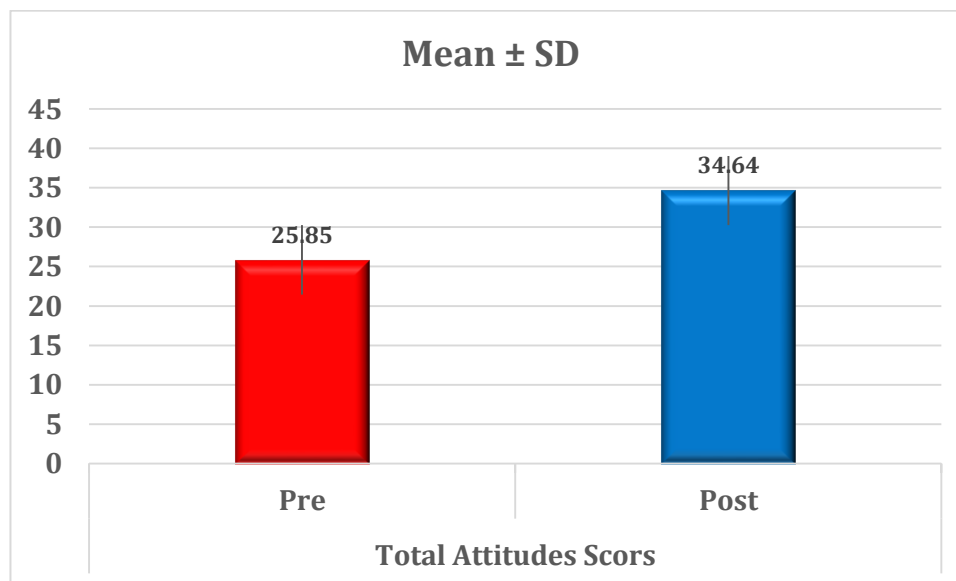


Fig 1: Total mean score of attitudes regarding food safety among Food handlers’ Pre/Post program (n=65)

Table 3: Mean scores of Food handlers’ reported practices regarding food safety pre/post program (n=65)

Items	Pre	Post	t	p
	Mean ± SD	Mean ± SD		
Personal hygiene and preventive measures	55.05±3.61	62.73±5.86	22.775*	<0.001*
Food preparation and separation	13.26±2.21	14.88±0.47	5.974*	<0.001*
Food cooking and reheating	9.30±0.96	9.87±0.34	6.338*	<0.001*
Keep food at a safe temperature	3.86±1.62	4.02±1.53	0.821*	<0.001*
Use safe water and safe raw materials	10.0±0.0	10.0±0.0	-	-
Total practices	91.47±3.45	101.51±6.85	15.880*	<0.001*

t: Paired t-test

p: p value for comparing between the pre and post

*: Statistically significant at $p \leq 0.05$

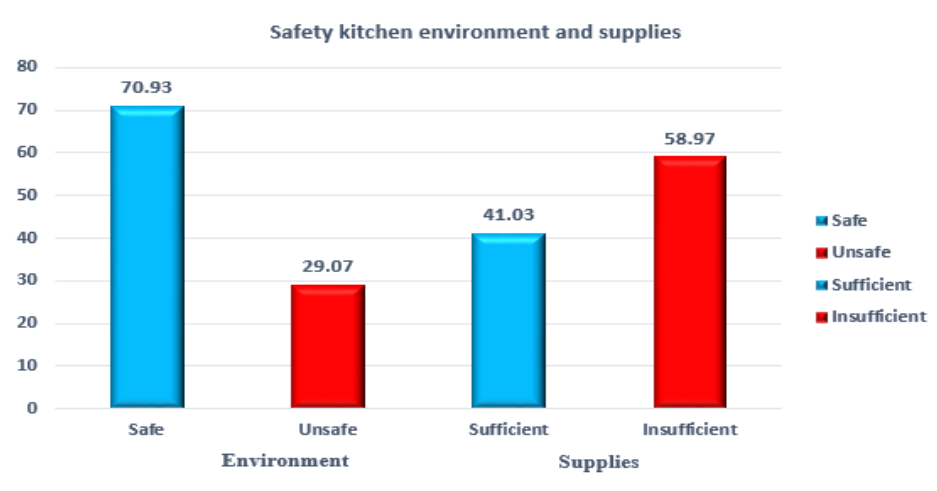


Fig 2: Distribution of safety kitchen environment and supplies (n=1)

Table 4: Correlation between knowledge, practices and attitudes of the studied sample (n=65)

Items	Pre		Post	
	r	p	r	p
Knowledge & attitudes	0.803*	<0.001*	0.919*	<0.001*
Knowledge & practices	-0.125	0.252	0.926*	<0.001*
Attitudes & practices	0.371*	<0.001*	0.935*	<0.001*

r: Pearson coefficient

*: Statistically significant at $p \leq 0.05$

Table 5: Relation between age and overall food handlers' practices (n=65)

Age (years)	overall food handlers' practices	
	Pre	Post
	Mean \pm SD	Mean \pm SD
20- 29	70.40 \pm 1.82	79.40 \pm 1.14
30-39	66.68 \pm 2.41	79.68 \pm 5.29
40-49	66.47 \pm 4.01	72.28 \pm 7.84
50-60	65.20 \pm 3.14	79.45 \pm 1.70
f(p)	10.531*($<0.001^*$)	3.348*(0.023*)

f: F for ANOVA test

p: p value for comparing between the pre and post

*: Statistically significant at $p \leq 0.05$

4. DISCUSSION

WHO defines food safety as the conditions and measures that are necessary during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption, (WHO, 1994). Food safety remains a critical issue nowadays among professionals in the food service sector as well as consumers, (Badrie et al., 2006).

The results of the current study showed that, knowledge scores increased significantly between (25.74 \pm 12.33) before implementing the program and (44.88 \pm 8.13) after implementing the program with p value ($P \leq 0.001$) denoting significant difference in the level of food safety knowledge between pre and post scores.

This was in the line with the study of **Sung-Hee Park et al., (2010)** whose study was evaluation of the food safety training for food handlers in restaurant operations found that Employee knowledge of the intervention group also showed a significant improvement in their score, increasing from 49.3 before the training to 66.6 after training.

In the current study, it was found that attitude scores increased significantly between 25.85 ± 3.3 before implementing the program and 34.64 ± 1.5 after implementing the program. In total it appeared that there was improved food safety attitude between the pre-test and the post-test with a statistically significant difference ($P \leq 0.001$)

This agreed with the study of **Al-Mohaithef, (2014)** it was found that, foodservices staff had positive attitudes regarding food hygiene issues. Both groups (control and intervention) obtained high level initially, although of the intervention group's attitudes had a significant improvement after training ($p < 0.01$). The mean scores for the intervention group was 19.8 (79.2%) before the training and increased to 21.1(84.4%) after. This indicates that, food safety training can also affect staff's attitudes.

On the other hand, this was in controversy with the study of **Ehiri et al., (1997)** since they did not detect any improvements in the control group's knowledge, attitudes and opinions in the pre and post-tests.

The current study results show that, reported practices scores increased significantly between 91.47 ± 3.45 before implementing the program and 101.51 ± 6.85 after implementing the program. In the total scores it appeared that there were improved food safety practices between the pre-test and the post-test with a statistically significant difference (< 0.001).

In the same direction the study by **Al-Mohaithef, (2014)**, There was no difference between both groups in the first test ($p < 0.05$). The mean scores for the control group was 9/10(90%) and 8.7/10(87%) for the intervention group. Although both groups showed a high level of good practices, there was a significant improvement after the training in the intervention group ($p < 0.05$). After the training, the total mean scores for the intervention group increased to 9.7/10(97%) while those for the control group showed a minor decrease to 8.8 (88%).

Similarly, the study by **Wahdan et al., (2019)**, who studied Effect of an Educational Program on Food Safety Practices in Food Preparation and Handling Procedures in Governmental Hospitals of an Egyptian Governorate, there found significant differences between both pre and post intervention practice scores ($P = 0.000$).

This was in controversy with the study of **Park et al., (2010)**, who found that in terms of employee practices and the sanitation performance, there were no significant increases after the training.

The Findings by **Adesokan et al., (2015)**, who studied Food Safety Training Is Associated with Improved Knowledge and Behaviors among Foodservice Establishments' Workers, who indicated a significant association between refresher training and the knowledge as well as practice levels of food handlers.

In the present study there were positive correlation between knowledge and attitudes ($P < 0.001$), Knowledge and practices ($P < 0.001$), Attitudes and practices ($P < 0.001$), which were statistically significant. These findings indicated that level of food handlers' Knowledge about food safety affected their practices and attitudes in safe handling of the food and their attitudes influence their practices.

In the same direction, the study by **Sani & Siow, (2014)**, who studied Knowledge, attitudes and practices of food handlers on food safety in food service operations at the Universiti Kebangsaan Malaysia, who found positive association among the level of knowledge, attitudes and practices ($P < 0.05$).

In the same line with the current study, the study by **Elsherbiny et al., (2019)**, who studied Knowledge, attitude and practices of food safety among food handlers in Ismailia city hospitals, Egypt. who found positive correlations between knowledge, attitudes and practices ($P < 0.05$).

In the contrast with the current study, the study by Roberts et al., (2008), who studied Food safety training and foodservice employees' knowledge and behavior. Who indicated that training can improve knowledge and behaviors, but knowledge alone does not always improve behaviors.

5. CONCLUSION

There are statistically significant ($P < 0.001$) difference between studied food handlers' mean scores of Knowledge, attitude and practices regarding food safety and prevention of foodborne diseases (pre/post) implementing of the program.

6. RECOMMENDATIONS

- It is recommended therefore to conduct regular training courses for all food handlers as part of their continuous education
- Distributes educational booklet about food safety and prevention regarding foodborne diseases for all food handlers under the study and their supervisors and managers.
- Regular follow up and updating for implementing the program.
- Training for newly food handlers' workers.

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