

Training Program among Hospital Food Handlers' Regarding Food Borne Diseases

*Dr. Amany Mohamed Saad,** Dr. FuratHussein Mahmoud, and **Dr. Baghdad Hussein Mahmoud

**Lecturer in Community Health Nursing Department, and*

***Lecturers in Adult Health Nursing Department, Faculty of Nursing, Helwan University, Cairo, Egypt.*

Corresponding Author: Dr. Amany Mohamed Saad

Abstract:

Background: Foodborne diseases pose a significant public health burden worldwide. Food handlers play prominent roles in the transmission of foodborne diseases because of their poor knowledge about safe food handling. **Aim:** Was to assess the effect of training program among hospitals food handlers regarding food borne diseases. **Design:** A quasi-experimental study design. **Setting:** The study was carried out in two hospital kitchens of Ain Shams University hospital and El-Shiekh Zayed Alnahian hospital, Egypt. **Sample:** Convenient sample of 40 food handlers working in the above mentioned settings. **Tools:** Two tools were used to collect data include the first: An interview questionnaire sheet involved four parts socio-demographic characteristics, medical history, assessment sheet for evaluation of kitchen conditions and questionnaire to assess food handler's knowledge, and the second: Observational checklist used to assess food handler's practices. **Results:** The study revealed statistically significant improvement among studied sample food handlers knowledge and practice about food borne diseases post the training program. This difference was significant at ($p < 0.001$). **Conclusion:** The training program has a positive effect to improve the food handlers' knowledge and practices regarding foodborne diseases. **Recommendations:** Regular mandatory training program for large number of hospital food handlers to renew their information about food safety and hygiene. Raising awareness of all workers and staff involved in hospital food services and prevention of foodborne diseases by mass media such as workshops and posters.

Key words: Training program, food handlers, food borne diseases.

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I. Introduction

Food borne diseases are the most prevalent health problem in the current world and a significant cause of reduced economic productivity in both developed and developing countries (Mahami and Odonkor, 2012). The occurrence of food borne diseases has been increased, frequently associated with outbreaks, and threatens global public health safety and raises international concern (Kuchenmuller et al., 2013).

According to the (World Health Organization (WHO), 2014), food borne diseases and illnesses resulting from digestion of foodstuffs contaminated with microorganisms and chemicals.

Food borne illnesses are usually infectious or toxic and caused by bacteria, viruses, parasites or chemical substances entering the body through contaminated food and water. Unsafe food poses global health threats, endangering everyone. Infants, young children, pregnant women, the elderly and those with an underlying illness are particularly vulnerable. Food borne diarrheal disease kills about two million people yearly, particularly in developing countries (WHO, 2015).

Food hygiene practices are activities carried out by food handlers to protect food from contamination and ensure a safe supply of food for users (Thelwell-Reid, 2014). The hygiene practices cover proper storage of food substances, keep clean environment during food preparation, and assure all dishes served clean and free of bacteria that can possibly cause further contamination and cause food borne disease (Lee et al., 2012).

Food hygiene in the hospital can acquire peculiar features: Indeed, many patients could be more vulnerable than healthy subjects to microbiological and nutritional risks; big numbers of persons can be exposed to infections and possible complications; gastroenteritis can impair digestion and absorption of nutrients and the perception or fear about poor food hygiene practices might result in patients refusing the meals supplied by the hospital catering (Buccheri et al., 2007).

Food handlers are anyone who work in a food and drink establishments and who handle food, and contact with any equipment or utensils that are likely to be in contact with food, such as cutlery, plates, bowls, or chopping boards (Scallan et al., 2011). Food handlers are crucial links in the food chain from farm to fork.

The safety of our food depends mainly on them. However, malpractices have been reported on many occasions resulting in food poisoning outbreaks. Hence it is essential that food handlers are properly trained so that they take the necessary precautions to avoid such accidents (**GaungooandJeewon,2013**).

Food handlers play a major role in transmitting pathogens passively which leads to carry some human specific food borne pathogens and ensure food safety and hygiene through the chain of producing, processing, storage, and preparation of food. Mishandling and neglecting of good hygiene measures may result in food contamination and its attendant consequences (**Andy et al., 2015**) and (**Sharif et al., 2015**). Not all food handlers know the roles they must play, such as adopting basic hygienic practices when preparing food to protect their health and that of the broader community (**WHO, 2015**). Poor sanitary practices in food storage, handling, and preparation can form an environment in which bacteria and other infectious agents easily grow, multiply and spread (**Boro et al., 2015**).

Training is a planned activity to modify or transfer knowledge, skills, and attitudes through learning experiences. Persons may require training for a variety of reasons, including the need to maintain levels of competence, respond to the demands of changing circumstances and new approaches and technologies. (**Management Sciences for Health, 2012**).

Significance of the study:

Adequate amounts of healthy and safe foods are important to maintain life and promote good health. Nearly 600 million people, nearly one out of every ten people in the world who fall ill after having contaminated food, and another 420,000 die every year (**WHO, 2015**).

Statistics of (**Food Safety Conference, 2013**) revealed that 30 million Egyptians are infected with dangerous diseases due to contamination of water, food and environment, this made Egypt one of the world's greatest affected countries 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. In hospital catering, food service staff are the main food handlers, although nurses and other staff may distribute or serve meals, they signify a potential source of nosocomial foodborne outbreaks, since they may possibly introduce pathogens into foods during every phase from purchase to distribution (**Angelillo et al., 2011**). Therefore the researchers saw there is essential for training program among hospital food handlers to prevent spread of food borne diseases.

Aim of the study:

Was to study the effectiveness of training program among hospitals food handlers' regarding food borne diseases this achieved through:

- 1- Assessing the knowledge and practice of food handlers' about food borne disease causes.
- 2- Implementing a training program for participating of hospital food handlers about hygienic practice.
- 3- Evaluating the effectiveness of a training program on food handlers knowledge and practices.

Hypotheses

The food handlers' knowledge and practices regarding food borne diseases will be improved after receiving the training program than before.

II. Subjects and Methods

Design: This study utilized a quasi-experimental study design.

Setting: The study was carried out in two hospital kitchens of Ain Shams University hospital and El-Shiekh Zayed Alnahian hospital, Egypt.

Sample: Convenient sample of 40 food handlers who agreed to participate in the study (23 food handlers from Elshikh Zayed Alnahian hospital and 17 from Ain Shams university hospital).

Data Collection Tools: Two tools were used to collect data include an interview questionnaire sheet, and observational checklist.

The first tool: A structured Interview Questionnaire; it consisted of four parts:

Part I: It involved socio-demographic characteristics such as age, sex, educational level, and experience ... etc.

Part II: It included medical history; which includes health certificate, immunization status, and periodic examinations etc.

Part III: Assessment sheet for evaluation of kitchen conditions and food handlers hygiene, it consisted of :

- 1- **Floors and walls as:** Floor clean regularly or not and wall free from visible dust, dirt or spider web or not...etc.
- 2- **Lighting and ventilation as:** Kitchen provided with adequate lighting and ventilation systems or not.
- 3- **Kitchen equipment's as:** The equipment's kept clean and free from visible dirt or not....etc.
- 4- **Food handlers as:** Wear appropriate clothes or not....etc.

Scoring system: Questions were scored one for yes, and zero for no.

Part IV: Questionnaire to assess food handler's knowledge. This part was used pre and post training program. It include time of washing the hands and what needed for wearing disposable gloves ...etc.

Scoring system for knowledge:

The scoring system for knowledge was categorized into, each correct choice scored two, while incorrect answer or don't know scored one, the total score was calculated for each food handler by adding the score of each item of the sheet. It ranges from 12 – 24 points. The total scores were evaluated as follows:

- Poor knowledge (< 50%) (with scores ranged from <18)
- Fair knowledge (50 - < 75%) (with scores ranged from 18 - 21)
- Good knowledge (\geq 75%) (with scores ranged from >21)

The second tool: An observational checklist used to assess food handler's practices. This part was used pre and post training program. It contains practice of personal hygiene, food supply and storage...etc.

Scoring system for practice:

Questions were scored as the following: Never takes one, sometimes takes two, and always takes three points. It ranges from 18 – 54 points and the total scores were categorized as the following:

- Inadequate practice (<60%) with scores < 40).
- Adequate practices (\geq 60%) (with scores \geq 40).

Validity:

The validity of the tools was tested by being offered to 5 academic experts from Community Health Nursing and Adult Health Nursing from the Faculty of Nursing to determine relevance, clarity, completeness and comprehensiveness of the tools, experts' responses either agree or disagree about the face validity. Then their opinions are reviewed and final questionnaire was prepared and used.

Reliability:

The reliability of the tools was measured through ten percent of the food handlers using the established questionnaire and retested after one week on the same sample and the results were the same in each time. Testing reliability of proposed tools was done by Cronbach alpha test

The reliability of the knowledge and practice		
	Number of items	Cronbach's alpha
Knowledge	12	0.827
Practice	18	0.791

Ethical considerations: The ethical research consideration in this study was including the following:

The researchers explain the objective and aim of the study to the subjects who agreed to participate in the study. Subjects were informed that they are allowed to have choice to participate or not in the research and that they have the right to withdraw from the research at any time. Data collection was for research only and it was burned after data analysis.

Pilot Study:

A pilot study was carried out on 10% of sample size, involving 4 food handlers to evaluate the efficiency, reliability, clarity and applicability of the tools. Subjects included in pilot study were not excluded from the total sample as no modification of study tools were done.

Field work:

After obtaining official permissions to carry out the study, the researchers introduced themselves to the food handlers and explained the purpose of the study. The oral consent was obtained from the participant. The data collection of the study took a period of six months from beginning of February and to the end of July 2017

in the previously mentioned settings, and the researchers were available in the study settings twice/week from in the morning and afternoon shift. The structured interview questionnaire took about 25 minutes to be filled. Posttest were conducted at the end of the training program.

Administrative Design:

The present study was carried out after taking an official permission from the administrators of the study settings at Ain Shams Hospital and El-Shiek Zaied by presenting an official letter taken from the Faculty of Nursing, Helwan University, after the aim of the study was explained clearly.

Training program was done in four phases:

Assessment phase: The researchers interviewed each subject individually and clarified the aim of the study, then asked for participation. They met the subjects and filled the questionnaire to evaluate their knowledge and practice about food borne diseases to collect personal data and assess the kitchen condition. The data that was obtained during this phase was considered the basis for training program (pretest).

Planning phase: After identifying the needs in the assessment phase for the food handlers, training program was designed and developed by the researchers, based on the assessment phase results. It was designed to improve subject's knowledge and practice regarding food borne diseases. The program included details about meaning, signs and symptoms, causes, precautions for prevention of food borne diseases, hand washing, and wearing glovesetc.

Implementation phase: The training program about food borne diseases was established in simple Arabic language to be appropriate for subject's understanding. It stressed the areas of deficit in knowledge and practice about food borne diseases. The food handlers were divided into 5 groups each group contains 8 subjects and the training program was applied in 6 sessions; 3 sessions for theoretical and 3 sessions for practical part. The duration of each session ranged between 30-45 minutes. At the beginning of each session, the researchers started by giving a summary about the previous session and explaining the objective of the new one. Diverse teaching methods were used comprising lectures, small group discussion, brainstorming and demonstration. The teaching aids used were booklets, colored posters and show the laptop screen. The training program was done in 6 months given in an average of two days per week.

Evaluation phase: The evaluation was assessed one time immediately through posttest using the same format of pretest tools.

Limitation of the study: Some food handlers were not present all time so data collection takes a lot of time. The total number of the subjects were 43 food handlers three of them refused to participate in the research due to their workload.

Statistical analysis:

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Data were tested for normality of distribution prior to any calculations. Continuous data were normally distributed and were expressed in mean \pm standard deviation (SD). Categorical data were expressed in number and percentage. The chi-square test was used for comparison of variables with categorical data. Statistical significance was set at $p < 0.05$.

III. Results

Table 1. Indicates the socio-demographic characteristics of the studied sample. According to the table the mean age of the studied sample is (34.6 ± 6.4) years and three fifths (60%) of them in the age group (31- 40 years) and more than half (55%) are male, tenth (10%) of them have university education and more than half (52.5%) of them read and write, less than half (42.5%) of them have (6-10) years of experience and minority (7.5 %) of them have 16-20 years of experience. Three quarter (75%) of them are domestic staff (workers).

Table 2. Illustrates that majority (97.5%) of the studied sample not have health certificate and not take immunization. All of them (100%) not have periodic examination and not implement Hazard Analysis and Critical Control Points (HACCP) system.

Table 3. Presents evaluation of kitchen conditions and food handlers hygiene pre and post training program. Regarding to floor and wall the score increased from (20% to 85% and 12.5% to 87.5% respectively). Related to lighting and ventilation it improved from (15% to 72.5% and 12.5% to 67.5%

respectively). Regarding to kitchen equipment's and food handlers hygiene, the equipment's stored on shelves under conditions which prevent contaminations improved from (35% to 85%). As well food handler's nails short and clean also improved from (22.5% to 75%). After the training program and there is a significant improvement related to all items ($p < 0.001$).

Table 4. Illustrates the knowledge of food handlers pre and post training program, questions related to time of hand washing and wearing disposable gloves with it, there was an improvement in studied sample responses post training, 60% of them responded that they wash their hands for one minute post training compared to 42.5% pre it and 92.5% responded that they put on gloves after hand washing post training program compared to 65% pre it.

In relation to the safest way to thaw (defrost) food, no one gives the ideal answer about how to put it in the refrigerator but 70% of them responded that they put it in a container at room temperature after the training. 92.5% responded that they stored chemicals such as cleaners and sanitizers away from any food or clean equipment and utensils. Only 55% of the studied sample reported correct answer about the meaning of food borne diseases pre training program which increases to reach 92.5% post training program.

Table 5. Illustrates the comparison of the practice of the studied sample pre and post training program. In relation to personal hygiene, 75% of the studied sample post the training responded that they always check cleanliness of clothes, hair restraints and shoes before work and wash hands before handling food. Post training program 95% of them answered that they always use protective clothing when they touch or distribute unwrapped foods. In relation to smoking, 87.5% of the studied sample responded that they shouldn't always smoke while working and they always cover their mouth and nose when coughing or sneezing. In relation to food supply and storage, majority of them responded after the training that they always store separately raw food and cooked foods in refrigerator and freezers and they always wash and sanitize fresh vegetables and fruits before use. Regarding working environment, 87.5% of the studied sample responded post training that they always check if equipment and facilities work well and maintain them properly, they always verify if lightness and illumination of working area are appropriate and manage them properly and they always clean and maintain toilet facilities regularly ($p < 0.001$).

Table 6 and figure 1. Reveals that 42.5% of the food handlers had poor level of knowledge score regarding food borne diseases pre training program and improved to 10% and 85% of the food handlers who had fair and good level of knowledge post training respectively. This difference was significant ($p < 0.001$).

Table 7 and figure 2. Shows that 67.5% had inadequate practice score about food borne diseases pre training program and improved to 87.5% for food handlers who had adequate practice. This difference was significant ($p < 0.001$).

Table 1. Socio-demographic characteristics of hospitals food handlers.

Items	No	%
Age (years)		
20 to 30 years	9	22.5
31 to 40 years	24	60.0
41 to 50 years	7	17.5
Range	21 – 48	
Mean ±SD	34.6 ±6.4	
Sex		
Male	22	55.0
Female	18	45.0
Educational Level		
Read/Write	21	52.5
Diploma	15	37.5
University	4	10.0
Duration of experience		
< 5 years	6	15.0
6 – 10 years	17	42.5
11 – 15 years	14	35.0
16 – 20 years	3	7.5
Occupation and work activity		
Cooks	6	15.0
Dietitian	4	10.0
Domestic staff(workers)	30	75.0

From where do you get information regarding Hazard Analysis and Critical Control Points (HACCP) and food hygiene in the hospital?		
No where	36	90.0
Audio or visual materials	1	2.5
Mass media	3	7.5
Do you think you need more information about HACCP and food hygiene in hospitals?		
Yes		
No	28	70.0
	12	30.0

Table 2. Medical history of the hospitals food handlers.

History	Yes		No	
	No	%	No	%
Have you had a valid health certificate?	1	2.5	39	97.5
Immunization status	1	2.5	39	97.5
Periodic examinations carried out for workers	0	0	40	100.0
Has the HACCP system been implemented?	0	0	40	100.0
Have you ever heard about HACCP or any other food safety standards?	9	22.5	31	77.5

Table 3. Frequency distribution of evaluation of kitchen conditions and food handlers hygiene.

Hygienic practice items	Pre		Post		Chi square test	
	No	%	No	%	X ²	P
Floor and walls						
The floor clean regularly						
No	32.0	80.0	6	15.0		
Yes	8	20.0	34	85.0	33.885	<0.001
The wall free from visible dust, dirt or spider web						
No	35	87.5	5	12.5		
Yes	5	12.5	35	87.5	45.000	<0.001
The wall free from holes and cracks						
No	32	80.0	10	25.0		
Yes	8	20.0	30	75.0	24.261	<0.001
Lighting and ventilation						
The kitchen provided with adequate lighting systems						
No	34	85.0	11	27.5		
Yes	6	15.0	29	72.5	26.870	<0.001
The kitchen provided with adequate ventilation systems						
No	35	87.5	13	32.5		
Yes	5	12.5	27	67.5	25.208	<0.001
Kitchen equipment's						
The equipment's kept clean and free from visible dirt						
No	31.0	77.5	12	30.0		
Yes	9	22.5	28	70.0	18.152	<0.001
Modes of cleaning and sanitizing of utensils with hot and cold water and detergent						
No	30	75.0	7	17.5		
Yes	10	25.0	33	82.5	26.600	<0.001
Equipment's stored on shelves under conditions which prevent contaminations?						
No	26	65.0	6	15.5		
Yes	14	35.0	34	85.0	20.833	<0.001
Food handlers						
All food handlers wear appropriate clothes						
No	36	90.0	8	20.0		
Yes	4	10.0	32	80.0	39.596	<0.001
Food handlers' nails short trimmed and clean						
No	31	77.5	10	25.0		
Yes	9	22.5	30	75.0	22.064	<0.001
Food handlers has any kind of visible skin rash and unwrapped wounds						
No	37	92.5	9	22.5		
Yes	3	7.5	31	77.5	40.102	<0.001
Handlers wear any type of jewelry						
No	27	67.5	9	22.5		

Yes	13	32.5	31	77.5	16.364	<0.001
The receptacles properly covered and tight						
No	31	77.5	12	30.0		
Yes	9	22.5	28	70.0	18.152	<0.001
Hand washing done always after toilet						
No	29	72.5	16	40.0		
Yes	11	27.5	24	60.0	8.584	0.003

Table 4. Frequency distribution of food handlers knowledge between pre and post training program.

Knowledge items	Pre		Post		Chi square test	
	No	%	No	%	X ²	P
Washing hands properly : duration of rubbing hands with soap were						
10 seconds	6	15.0	0	0.0		
20 seconds	17	42.5	16	40.0		
1 minute	17	42.5	24	60.0	7.225	0.027
Needed necessarily for wearing disposable gloves						
Wash hands and then put on gloves	26	65.0	37	92.5		
Put on gloves and then wash gloved hands	6	15.0	1	2.5		
Put on gloves without washing hands	8	20.0	2	5.0	9.092	0.011
The proper holding temperature in cooked foods						
Above 75° C at all times	18	45.0	29	72.5		
Between 23° C and 75° C at all times	16	40.0	10	25.0		
Above 23° C at all times	6	15.0	1	2.5	7.531	0.023
The safest way to thaw (defrost) foods is						
In a container at room temperature	22	55.0	28	70.0		
In a sink with hot running water	12	30.0	12	30.0		
In a sink at room temperature over night	6	15.0	0	0.0	6.720	0.035
Best way to control insect vectors and rodents in the kitchen						
Apply pesticide every day	6	15.0	3	7.5		
Just sweep the floor	15	37.5	7	17.5		
To keep the garbage area clean, and eliminate routes of entry	6	15.0	17	42.5		
All of above	13	32.5	13	32.5	9.170	0.027
Must you store chemicals such as cleaners and sanitizers						
Away from any food or clean equipment and utensils	24	60.0	37	92.5		
At least 6 inches above the floor	4	10.0	0	0.0		
With equipment and clean utensils	4	10.0	2	5.0		
On the shelf above food and utensils	8	20.0	1	2.5	12.882	0.005
Must be at hand washing sinks at all times						
Hot and cold running water, soap, and single-use paper towels	23	57.5	35	87.5		
Hot running water, nailbrush, paper towels, and hand sanitizer	9	22.5	1	2.5		
Hot running water, soap, hand sanitizer and single-use paper towels	8	20.0	4	10.0	10.216	0.006
Meaning of food borne diseases						
Correct	22	55.0	37	92.5		
Incorrect or don't know	18	45.0	3	7.5	14.528	<0.001
Diseases that transmitted by food						
Correct	13	32.5	28	70.0		
Incorrect or don't know	27	67.5	12	30.0	11.257	<0.001
Causes of food borne diseases						
Correct	25	62.5	37	92.5		
Incorrect or don't know	15	37.5	3	7.5	10.323	<0.001
Signs and symptoms of food borne diseases						
Correct	25	62.5	36	90.0		
Incorrect or don't know	15	37.5	4	10.0	8.352	0.004
Precaution for prevention of food borne diseases						
Correct	22	55.0	37	92.5		
Incorrect or don't know	18	45.0	3	7.5	14.528	<0.001

Table 5. Frequency distribution of food handlers practice between pre and post training program.

Practiceitems	Pre		Post		Chi square test	
	No	%	No	%	X ²	P
Personal hygiene						
Check cleanness of clothes, hair restraints and shoes before work						
Never	9	22.5	0	0.0		
Sometimes	23	57.5	10	25.0		
Always	8	20.0	30	75.0	26.858	<0.001
Wash hands before handling food						
Never	9	22.5	2	5.0		
Sometimes	22	55.0	8	20.0		
Always	9	22.5	30	75.0	22.296	<0.001
Use gloves when touch or distribute unwrapped foods						
Never	16	40.0	3	7.5		
Sometimes	17	42.5	2	5.0		
Always	7	17.5	35	87.5	39.404	<0.001
Use protective clothing when touch or distribute unwrapped foods						
Never	7	17.5	1	2.5		
Sometimes	16	40.0	1	2.5		
Always	17	42.5	38	95.0	25.753	<0.001
Use mask when touch or distribute unwrapped foods						
Never	21	52.5	2	5.0		
Sometimes	11	27.5	10	25.0		
Always	8	20.0	28	70.0	26.854	<0.001
Clean the work area before start work						
Never	6	15.0	3	7.5		
Sometimes	16	40.0	1	2.5		
Always	18	45.0	36	90.0	20.235	<0.001
The same towel can be used to cleaning many places						
Never	14	35.0	4	10.0		
Sometimes	18	45.0	16	40.0		
Always	8	20.0	20	50.0	10.816	0.004
We shouldn't smoke while working						
Never	22	55.0	2	5.0		
Sometimes	16	40.0	3	7.5		
Always	2	5.0	35	87.5	54.994	<0.001
Cover mouth and nose when coughing or sneezing						
Never	13	32.5	2	5.0		
Sometimes	17	42.5	3	7.5		
Always	10	25.0	35	87.5	31.756	<0.001
Food supply and storage						
Check and verify whether temperature of refrigerators and freezers are appropriate						
Never	14	35.0	2	5.0		
Sometimes	15	37.5	6	15.0		
Always	11	27.5	32	80.0	23.113	<0.001
Store separately raw food and cooked foods in refrigerator and freezers						
Never	11	27.5	2	5.0		
Sometimes	16	40.0	3	7.5		
Always	13	32.5	35	87.5	25.209	<0.001
Washing and sanitizing fresh vegetables and fruits before use						
Never	19	47.5	2	5.0		
Sometimes	16	40.0	3	7.5		
Always	5	12.5	35	87.5	45.157	<0.001
Label cleaning and sanitizing chemicals and store them at safer place away from foods						
Never	19	47.5	1	2.5		
Sometimes	15	37.5	4	10.0		
Always	6	15.0	35	87.5	43.081	<0.001
Screen all windows and vents for controlling pest, and verify if there are gaps and cracks in walls and ceilings						
Never	10	25.0	3	7.5		
Sometimes	20	50.0	3	7.5		
Always	10	25.0	34	85.0	29.425	<0.001
Cleaning and sanitizing knives, cutting boards and wiping clothes						
Never	11	27.5	3	7.5		
Sometimes	15	37.5	2	5.0		
Always	14	35.0	35	87.5	23.513	<0.001
Working environment						
Seeing if equipment's and facilities work well and maintaining them properly						
Never	13	32.5	3	7.5		
Sometimes	18	45.0	2	5.0		
Always	9	22.5	35	87.5	34.414	<0.001

Verifying if lightness and illumination of working area are appropriate and managing them properly						
Never	14	35.0	1	2.5		
Sometimes	21	52.5	4	10.0		
Always	5	12.5	35	87.5	45.327	<0.001
Cleaning and maintaining toilet facility regularly						
Never	21	52.5	4	10.0		
Sometimes	8	20.0	1	2.5		
Always	11	27.5	35	87.5	29.526	<0.001

Table 6. Comparison of the total knowledge score between pre and post training program.

Total knowledge score	Pre program		Post program		Chi square test	
	No	%	No	%	X ²	p value
Poor(<50%)	17	42.5	2	5		
Fair(50%- <75%)	8	20	4	10		
Good(>75%)	15	37.5	34	85	20.543	<0.001

Figure 1. Distribution of the knowledge score at pre and post training program.

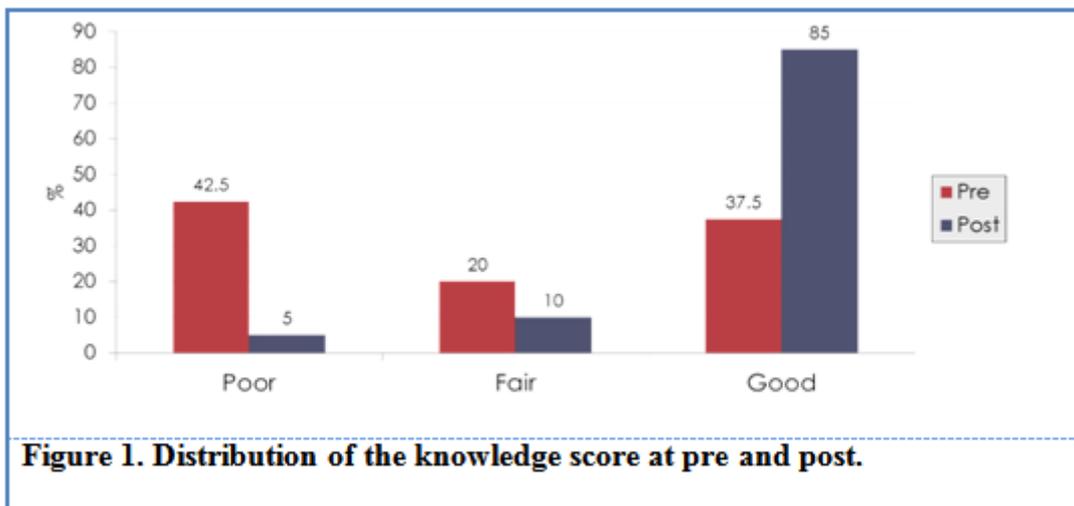


Figure 1. Distribution of the knowledge score at pre and post.

Table 7. Comparison of the total practice score between pre and post training program.

Total practice score	Pre program		Post program		Chi square test	
	No	%	No	%	X ²	p value
Inadequate (<60%)	27	67.5	5	12.5		
Adequate (≥60%)	13	32.5	35	87.5	20.543	<0.001

Figure 2. Distribution of the practice score at pre and post training program.

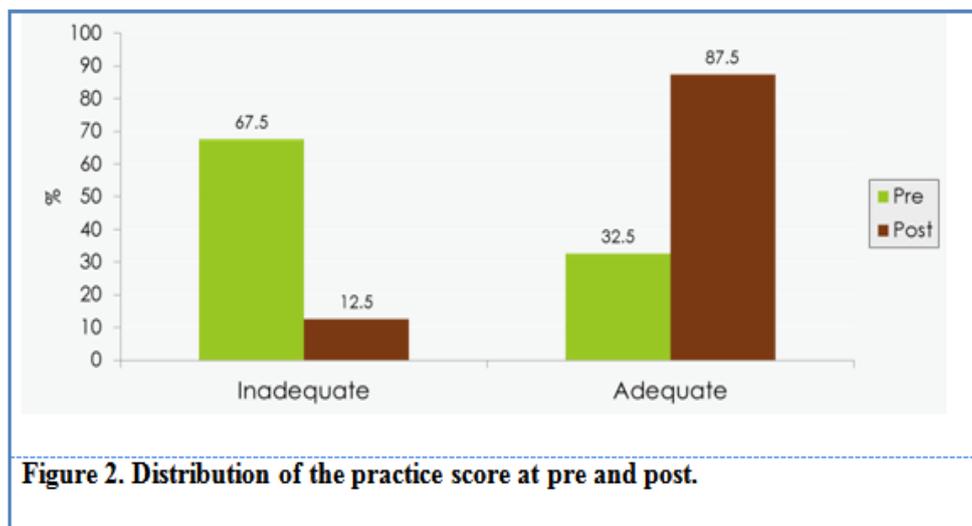


Figure 2. Distribution of the practice score at pre and post.

IV. Discussion

Preventing foodborne illness requires food hygiene and safety which incorporates all circumstances and methods essential to ensure safety of food at all phases of production, handling, preparation, and storage of food (**Tolulope et al., 2014**).

The results of current study revealed that the studied sample mean age is 34.6 ± 6.4 years, and three fifths of them in the age group 31- 40 years this is disagreement with a study done by (**Abdul Aziz and Dahan, 2013**) in Malaysia who reported that the majority of the respondents were in the age group 45 to 54 years.

The study findings displayed that tenth of food handlers had university education and more than half of them read and write. This in divergence with (**Ifiadike et al., 2017**) in Nigeria who stated that most of food handlers (72.7%) had secondary education and above, whereas (27.3%) had primary education and below. This may be due to that all the food handlers who had university education were supervisors and had the responsibility to ensure the food they prepare and serve meets the acceptable standards in terms of nutritional quality, temperature and safety.

The current study indicated that three quarter of food handlers were domestic staff (workers). This is in agreement with (**Reid, 2014**) in Jamaica who reported that 52% of the food handlers were employed as food workers, and about twelve percent were employed in management and supervisor. This may be due to the nature of the work area.

The present study illustrated that majority of the studied sample don't have health certificate and don't take immunization. Similar findings supported these results in a study carried out in Malaysia by (**Rosmawati et al., 2015**) who stated that most of food handlers (84.1%) showed that they had received typhoid immunization within three years. This may be due to most of food handler's believed that health certificate and immunization are not important as long as they are healthy.

The current study findings showed that majority of the studied sample responded post training program that they always wash and sanitize fresh vegetables and fruits before use. As well three quarter of them post training program responded that they always wash hands before handling food this is divergence with (**Ifiadike et al., 2017**) who said that 30.4% of food handlers used sanitizers and disinfectants at workplace, also 30.4% of them do proper hand washing with soap and water.

The current study indicated that food handler's nails short and clean improved post training program and majority of them responded that they shouldn't always smoke while working. These results were in the same line with (**Woh et al., 2016**) in Malaysia who listed that most respondents 90% took regular showers and kept their fingernails short, while the majority of them agreed that there should be no smoking during food preparation. This may be due to ignorance of food handlers that they should refrain from smoking, coughing and sneezing over the food, also other personal belongings like jewelry and other adornments should not be brought into food handling areas and food handlers should be aware by this.

The current results presented that less than half of the food handlers had poor level of knowledge regarding food borne diseases pre training program and improved to had fair and good level of knowledge post training program. This is in consistent with study done in Ethiopia by (**Tessema et al., 2014**) who reported that the majority of food handlers had poor knowledge on food handling practices and most of them had heard about food borne diseases of which had a good knowledge. This may be due to training program providing the food handler's with appreciated information that can increase their knowledge.

The results of the study showed that the knowledge score of the studied sample was improved post training program and the practice score post training program is adequate than pre it. It improved post the training. The difference was significant ($p < 0.001$). These results were in the same line with (**Nyamari, 2013**) in Kenya who proves that all food handlers knowledge scores increased from 50.6 ± 16.5 before training to 76.4 ± 15.5 after training ($P < 0.05$), and reported practices scores were increased from 101.3 ± 11.6 before training to 105.3 ± 12.2 after training ($P < 0.05$). This may be due to shortage of food handlers knowledge but they gained more experience and modify their knowledge and practices after the training program.

The above mentioned results proved the study hypothesis which presented that the training program will be effective in improving the food handlers knowledge and practices regarding food borne diseases.

V. Conclusion

The training program has a positive effect to improve the food handlers' knowledge and practices regarding food borne diseases.

Recommendations

- 1- Regular mandatory training program for large number of hospital food handlers to renew their information about food safety and hygiene.
- 2- Raising awareness of all workers and staff involved in hospital food services and prevention of foodborne diseases by mass media such as workshops and posters.

- 3- Providing education about hazard analysis and critical control points system and other appropriate standard food safety procedures to prevent foodborne diseases.

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