

Impact of Food Safety Educational Program on Food Handlers' Knowledge and Practice in Cairo Governorate

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Abstract: Food is an important basic necessity and vital for the sustenance of life. However, diseases spread through food are common and persistent problems that result in appreciable morbidity and occasionally in death. Many studies showed that third world countries have registered very high incidence of food borne diseases mainly due to improper, unsafe food handling. Therefore, the study **aimed** at examining the impact of a food safety knowledge educational program on food handlers' knowledge and practice in Cairo governorate, Egypt. **Setting:** the study was conducted at Abo El Soaud family health center, a multi clinic accredited center connected with health office, located in south Cairo. **Sample:** 10% of food handlers who are regularly screened for health certificate annually were selected randomly. **Tools of the study:** three tools were used; 1. Sheet of basic demographic and epidemiological data namely personal data, 2. Food safety knowledge questionnaire and 3. Observational checklist was used. **Results:** the study revealed that, nearly half of the studied sample aged between 20 to less than 30 years old, more than one third were secondary educated, and one quarter were single. A positive correlation was found between total knowledge scores of food handler's and total practice scores pre educational program with no statistical significant difference. A statistically significant positive correlation was found between total knowledge scores of food handler's and total practice scores post educational program. **Conclusion:** the study concluded that, a statistically significant differences were found between pre and post educational program in relation to knowledge subscales including location and services sub-scale, utensils and equipment, personal hygiene, food handling process and total knowledge score, also a statistically significant differences were found between pre and post educational program in relation to practice subscales including cleaning and waste disposal, pest control, cleaning and sanitation of food utensils, personal hygiene, food handling, and food cooking and total practice score, and there was a positive correlation between total knowledge scores of food handler's and total practice scores post educational program with statistical significant difference. **Recommendation:** the study recommended a provision of educational program for all food handlers as well as replication of the study on a nationwide large scale project to obtain more generalization of the results and to gain more consciousness about food borne diseases problem in Egypt.

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1. Introduction

Food is an important basic necessity, its procurement, preparation, and consumption is vital for the sustenance of life. However, diseases spread through food are common and persistent problems that result in appreciable morbidity and occasionally in death [1]. Food safety has been of concern to human kind since the dawn of history, and many of the problems encountered in our food supply go back to the earliest recorded years. Many rules and recommendations advocated in religious or historical texts are evidence of concern to protect people against food borne diseases and food adulteration [2].

Recently, there has been an increasing trend toward the sale and consumption of outside foods. This trend is more obvious in the urban areas, where due to the increasing population, changing life style, breakdown of joint family system, and increasing

number of working women compel people to depend on "ready to eat" foods. Therefore concern toward food safety has grown [3]. Food borne diseases continue to be a serious hazard and an important public health problem in developing as well as developed countries [4]. The general term of food borne illness refers to all diseases and other disorders that can result from consumption of contaminated foods. Although appropriate steps can be taken to prevent or reduce risks to health, food borne diseases have continued to present a serious public health Challenge. The traditional approaches of inspection and end product testing appear to have proved inadequate in tackling the problem and there is urgent need to apply more rational and effective strategies [4].

Food handlers play an important role in ensuring food safety throughout the chain of production,

processing, storage and preparation. Mishandling and disregard of hygienic measures on their part may enable pathogens to come into contact with food and, in some cases, to survive and multiply in sufficient numbers to cause illness in the consumer [3]. Occasionally, food handling personnel may transfer to food pathogens that they are carrying in or on their bodies, and such pathogens may survive and multiply in the food and subsequently cause disease [5].

Pathogens often transmitted through food contaminated by infected food handlers are *Salmonella typhi*, Shigella species, Staphylococcus aureus, Streptococcus pyogenes, hepatitis A virus, and the Norwalk and Norwalk-like viruses [6]. Researchers revealed that, intestinal parasites are most common, frequent and easily transmitted food borne disease among food handlers, its prevalence high enough to merit a spotlight on it as health problem [7]. Most food borne illness in foodservice are caused by one of three major factors: cooking, holding, cooling or storing foods at improper temperature; cross-contamination from improper cleaning and sanitizing of equipment and utensils; and poor personal hygiene [8]. For the period between 2000: 2004, the most common contributing factors were improper holding temperature (73%), poor personal hygiene (38%), and inadequate cooling (21%) [9].

Over the past two or three decades and during 21st century, public health authorities have been faced with an increasing number of food safety problems. In 2000, a joint food and Agriculture Organization/world health organization expert committee on food safety concluded that illness due to contaminated food was perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity, very costly for industry, health services, and society as a whole [10]. Food production should meet minimum standards including sufficient refrigeration facilities, training of food handlers and exception of ill handlers from work. An understanding of good personal hygienic practices, cross contamination, and the importance of temperature are all critical food borne illness prevention concepts for food retail workers to know. A good understanding of these concepts and implementation of preventive measures will help decrease the illness. Food safety education and training are the most effective methods to prevent food borne illness. Food handlers must not only know “what” to do, but also “how” and “why” it is being done [11].

Significance of the study

Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety. These efforts are in response to an increasing number of food

safety problems and rising consumer concerns. Education of consumers and training of food handlers is one of the most critical interventions in the prevention of food borne illnesses [10]. In Egypt, many outbreaks of food borne illnesses were a result of improper food handling practices either at home or in foodservice establishment. Of the food borne diseases reported between 1993 and 2004, 79% occurred in a food service establishment and 21% at home. All were related to unsafe handling practices. Of these outbreaks reported, 25% could have been prevented with safe food handling practices [12].

The majority of food service employees do not understand why food safety handling practices are important unless they are properly trained. Food handlers need food safety training and education that improve their understanding about how their job performance could significantly reduce the incidences of food borne illness [13]. So the study aimed at examining the impact of a food safety knowledge educational program on food handlers' knowledge and practice in Cairo governorate, Egypt.

2. Material and Methods

Study design

A quasi-experimental study using time series research design was implemented in the current study.

Sample

The current study was carried out on 200 male & female food handlers using simple random technique. First, the average number of food handlers attended the center annually for health certification screening was calculated (1850), 10% was taken from the total number (185) as a total sample size, to consider the drop-out, 10% were added to reach the needed sample size (200). All food handlers attending the center daily were listed, and then odd numbers were chosen to participate in the study after obtaining their informed consent.

Setting

The study setting was Abo El Soaud family health center, a multi clinic accredited center connected with health office, located in south Cairo, area dense with population and many food service establishments. This setting included some zones with moderate to low hygienic standards, and no doubt that the environmental hygiene directly affects the transmission of food born diseases like HAV. Field visits to food handlers' place of work were applied for environmental sanitation & practice assessment.

Tools

Data were collected through three instruments:

- 1- Sheet of basic demographic and epidemiological data namely personal data: as age, sex, residence, marital status and education, home and working environment (as

water supply, water closet and crowding index), as well as family history of any related symptoms of food borne disease.

- 2- Food safety knowledge questionnaire sheet: about sources of food contamination, personal hygiene, food handling, utensils and equipment, food spoilage, food poisoning and waste disposal and vermin's control.
- 3- A sanitation check- list: to check the practices of food handlers during handling the food, using the proposed code of practice by both WHO and FAO referring to food handling, equipment and utensils, food handlers, surrounding area and sanitary facilities.

3. Results

Regarding the socio-demographic characteristics the present study revealed that, nearly half of the studied sample (47%) aged between 20 to less than 30 years old and nearly one third of the studied sample (31%) aged between 30 to less than 40 years with a mean age 32.22 ± 10.534 years. Nearly three quarters of the studied sample (72%) had years of experience between 1 to less than 10 years with a mean years of experience 9.09 ± 9.488 years. Slightly more than one third of the studied sample (38%) was secondary educated and only 8% were either illiterate or can read and write. Regarding marital status, 72% of the studied sample was married, and one quarter

(25%) were single. The entire studied sample (100%) didn't have any food transmitted diseases either during this current year or the previous year. In relation to food handlers' knowledge, the study revealed that, 7% of the studied sample pre educational program had unsatisfactory knowledge as compared to 95% of studied sample got good knowledge scores post educational program in relation to restaurant location and service sub-scale, a statically significant difference was found between pre and post educational program in relation to second subscale of utensils and equipments (11%) of the studied sample pre educational program had unsatisfactory knowledge as compared to (61%) of studied sample post educational program have good knowledge. Moreover, with regard to personal hygiene sub-scale, (5.5%) of the studied sample pre educational program had unsatisfactory knowledge compared to 98.5% of studied sample post educational program and (27.5%) of them pre educational program had unsatisfactory knowledge compared to (89%) post educational program had good knowledge. Regarding practices of food handlers, statistically significant differences were found between pre and post educational program in relation to practice subscales, 10% of the studied sample had poor practice pre educational program compared to 80% of studied sample post educational program.

Table : The difference between pre and post educational program in relation to knowledge about food handling sub-scales and total score among the studied sample (n=200)

Items	Pre program	Post program	T	p
	Mean±SD	Mean±SD		
Location and services sub-scale	30.14±4.757	32.65±4.347	*-5.442	.000
Utensils and equipment	6.80±1.678	7.77±2.170	*-4.951	.000
Personal hygiene	31.04±2.270	35.27±3.337	*-14.352	.000
Food handling process sub-scale	29.82±3.415	26.56±4.173	*8.790	.000
Total knowledge score	97.80±8.542	102.24±8.625	*-5.285	.000

*Statistically significant level at $p < .05$

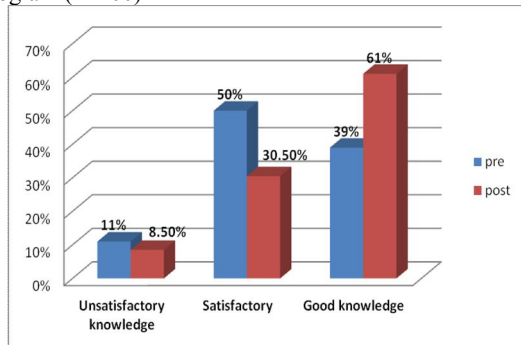
-The difference between pre and post educational program in relation to practices of food handlers among the studied sample (n=200)

Items	Pre program	Post program	T	p
	Mean±SD	Mean±SD		
Location and surrounding restaurant	11.53±1.676	11.87±2.515	.662	.513
Cleaning and waste disposal	14.60±2.111	17.27±3.877	*3.959	.000
Pest control	10.73±2.947	15.97±.183	*9.660	.000
Cleaning and sanitation of food utensils and equipment	24.07±3.342	29.97±.183	*9.599	.000
Personal hygiene	40.93±5.298	49.97±.183	*9.299	.000
Food handling	37.20±5.863	41.30±3.098	*3.720	.001
Food cooking	23.40±1.976	26.67±1.398	*7.307	.000
Total practice score	153.60±14.087	190.00±6.507	*13.241	.000

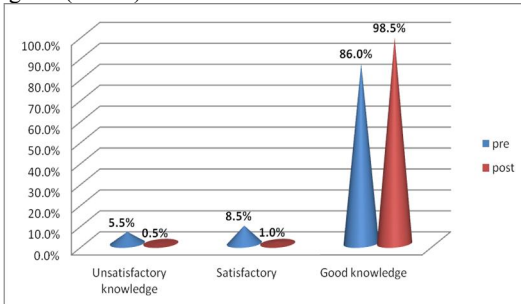
*Statistically significant level at $p < .05$



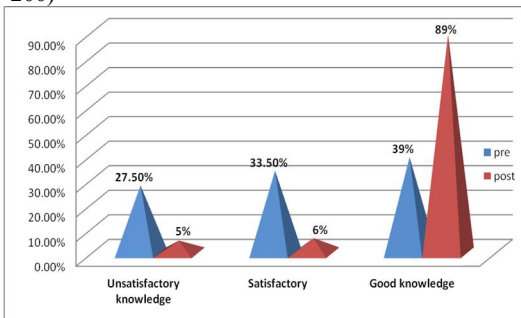
Frequency distribution of total score of location and services knowledge sub-scale pre and post educational program (n=200)



Frequency distribution of total score of utensils and equipments knowledge sub-scale pre and post educational program (n=200)



- Frequency distribution of total score of personal hygiene knowledge sub-scale pre and post educational program (n=200)



- Frequency distribution of total score of food handling knowledge sub-scale pre and post educational program (n=200)

4. Discussion

Health and well-being are highly valued in today's society and food is considered to play a major role. Food safety issues are complex and consumers vary greatly in their knowledge of the science of food safety [14]. Safe food is important in our daily lives. Improperly handled foods may cause illness, disability or even death [15]. Availability of safe food is a basic human right and is essential for adequate human health. Each year, millions of people become ill from food-borne diseases, the most common food safety-issue, although many cases are not reported [16].

Socio-demographic characteristics, of the studied sample.

The sample aged from 20 to less than 40 years old with mean average 32.22 ± 10.534 years. In agreement with the study (Mohsenn & Mahmoud), who studies the health status of food handlers in eating establishments in various educational and health institutions in Elkalubya city, Egypt [18,19,20], stated that, the majority of their study sample aged from 20 to 45 years. No statistically significant correlation was found between age and study samples' knowledge and practice, coincided with the study results of Zeil [21], who study food safety knowledge and attitude of workers from institutional and food service operations in Sudan, stated that no statistically significant correlation was found between age and study samples' knowledge and practice. In contrast to these findings, (Lee) [16] who study food borne illness outbreaks in Korea and Japan, revealed a positive statistically correlation between age and total knowledge and practice scores. This difference may be due to the continuous on-service training applied in Japan a developed country of "Lee" study, so food handlers gain knowledge with passing of age.

Regarding the educational level of food handlers, the present study revealed that, more than one third of the studied sample was secondary educated with no statistically significant correlations between educational level and study samples' knowledge and practice. In agreement with the study results of Udgiri & Masali, who studied the health status of food handlers employed in food establishments in Ethiopia [20] and revealed no statistically significant correlation was found between educational level and study samples' knowledge and practice. In contrast to these findings (Wyatt), [22] who study concerns, experiences, knowledge and practice of food market workers regarding sanitation and safe food handling procedures in Puerto Rico revealed a positive statistically significant correlation between educational level and total knowledge and practice scores of the study subjects. This difference may return to, usually in developed countries the

career of education for food establishment work is congruent with their work career.

Regarding the years of experience of food handlers, the present study clarified that nearly three quarters of the studied sample had years of experience ranged between 1 to less than 10 years with mean 9.09 ± 9.488 years, with no any statistically significant correlation between years of experience and study samples' knowledge and practice. This results is goes with El-sherbeeney^[19] who studied Food borne diseases and related food handlers risk factors in Sudan" and revealed no statistically significant correlation between years of experience and study samples' knowledge and practice. In contrast with the study results, Lee, ^[16] revealed a positive statistically significant correlation between the years of experience and total knowledge and practice scores of food handlers. This difference may be due to the on-going in-service training applied in developed countries that affect the level of knowledge of food handlers positively with passing of work years.

Knowledge of food handlers

The present study revealed a statistically significant differences between pre and post educational program intervention in relation to knowledge subscales including Location and services sub-scale, utensils and equipment, personal hygiene, food handling process and total knowledge score. In agreement with the study results (Mohssen & Mohamed), ^[18] mentioned that, program for food handlers had a positive effect on the sample knowledge and there were a statistically significant differences between pre and post educational program intervention in relation to knowledge subscales including location, utensils and equipment, personal hygiene, food handling process. This improvement in the knowledge of food handlers reflected the effectiveness of intervention program about food safety and their lack of awareness pre-program about food safety

Practice of food handlers

Results revealed a statistically significant differences between pre and post educational program intervention in relation to practice subscales including cleaning and waste disposal, pest control, cleaning and sanitation of food utensils, personal hygiene, food handling, and food cooking and total practice score. Meanwhile, no statistically significant difference found between pre and post educational program in relation to location and surrounding restaurant. In agreement with the study results (El-Sherbeeney, ^[19] revealed a statistically significant differences between pre and post educational program intervention in relation to practice subscales. In contrast with the study results (Udgiri & Masali,

^[20] revealed no statistically significant difference between pre and post educational program in relation to practice sub-scale. This difference between the two studies may be due to the difference in the educational levels between the food handlers which may affect their ability for implementation of safe food handling.

The present finding illustrated that, less than quarter of the studied sample had poor practice scores pre educational program while the majority of them had good practice scores in relation to food handling post educational program intervention. Also, there was a statistically significance correlation between knowledge of food handlers pre educational program and their practice scores post program. Meanwhile, no statistically significance correlation was found between knowledge scores of food handlers and their practice scores post educational program. In agreement with the study results (Udgiri & Masali), ^[20] mentioned that, the studied sample improved their practices regarding food handling after the program intervention with no statistical correlations between knowledge of food handlers post educational program and their practices post educational program. This may be due to lake of equipment and facilities needed for implementation of safe food handling program.

Conclusion

The current study concluded that, food handlers had a lack of knowledge regarding food safety, (including sources of food contamination, personal hygiene, food handling, utensils and equipment, personal hygiene, food poisoning and waste disposal), and also lack of safe food handling practices.

The study recommended the following:

- Education and training courses on safe food handling practices should be provided to all food handlers.
- Knowledge and understanding of food safety on the part of food handlers should be tested and it is suggested that a "health card" certifying an acceptable level of attainment should be issued to those who pass the test and repeated every 6 months.

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