

KNOWLEDGE, ATTITUDE AND PRACTICE OF FEMALE TEACHERS REGARDING SAFE FOOD HANDLING; IS IT SUFFICIENT? AN INTERVENTION STUDY, ZAGAZIG, EGYPT.

By

Awad Allah MB¹, El-Shafei DA², Abdelsalam¹ AE and Sheta SS².

¹ Department of Public Health and Preventive Medicine, ² Department of Community, Environmental and Occupational Medicine, Faculty of Medicine, Zagazig University.

Abstract

Introduction: Food borne diseases are one of the major health problems in developing and developed countries. Safe food handling at the household level is much acknowledged and an understanding of the interaction on prevailing safe food handling knowledge, beliefs and practices in order to minimize food borne outbreaks required. **Aim of work:** to 1- To determine level and sources of Knowledge of female teachers regarding safe food handling. 2- To assess their Attitude and Practice regarding safe food handling. 3- To evaluate the effectiveness of a health education program on Knowledge, Attitude, and Practice (KAP) of safe food handling among participants. **Materials and methods:** An intervention study was carried out from November 2015 to October 2016 among forty two (42) secondary school female teachers in Zagazig, Egypt. A pre-test was performed to determine level of KAP of safe food handling among participants through a face-to-face interview. Health education program was implemented to educate the participants in order to improve their KAP regarding safe food handling. Three months later a post-test questionnaire identical to the pre-test was done. **Results:** The mean age of the participants was 34.2±9.7, more than half of them were married (55.4%) and about one third of them acquired their safe food handling knowledge from the mass media. About two thirds (64.3%) of their household personnel suffered from self-limited gastroenteritis during the last three months. There was a highly significant improvement in Knowledge after intervention ($p < 0.01$).

and significant improvement in Attitude ($p < 0.05$), while; there was non-significant improvement in Practice ($p > 0.05$). The total KAP level was significantly improved ($p < 0.05$). **Conclusion:** the majority of respondents had unsatisfactory level of total KAP about safe food handling, both Knowledge and Attitude significantly improved after intervention. Items of purchasing and storage, safe food cooking were the most improved items in Knowledge and Attitude respectively. However, there was no effect of intervention on Practice level.

Key words: Safe food handling, Food borne diseases, Health education program, Knowledge, Attitude, and Practice.

Introduction

Food safety defined as the level of confidence that food won't cause sickness or harm to the consumer when it is served, prepared and eaten so it became an essential public health issue since years ago until now (WHO, 2003). However, food illnesses are defined as diseases, either infectious or toxic in nature, caused by agents that enter the body through food ingestion (WHO, 2007).

Food borne diseases are one of the major health problems in developing and developed countries. The World Health Organization (WHO) found that in developed countries, up to 30% of the populations experience food borne diseases every year, while in developing countries up to 2 million deaths are estimated per year 1.9 million of which are children, every day all over the world people get sick from the food they eat (Tessema et al, 2014).

As estimated by WHO, more than 30–40% of food borne diseased cases were happened at home. Food borne diseases are continuously expanding and the quantity of reported cases is underestimated because of the absence of outbreak reports in the home setting (Langiano et al, 2012).

In spite of the fact that there are more than 250 types of food-borne diseases, the majority of them can be prevented if certain safety measures are taken. Epidemiological information from various parts of the globe have demonstrated that a critical proportion of food-borne diseases could be credited to improper food processing practices in consumers' homes on the long run, home preparations play a major role on food-borne diseases. Contaminated raw foods, insufficient cooking and food consumption from a hazardous source were the factors most commonly

connected with reported outbreaks of food-borne diseases at homes. Polluted equipment, unsafe keeping of food (time/temperature), poor personal hygiene, food from unsafe sources, and inadequate cooking are the most common elements contributing to food-borne disease outbreaks (Sanlier and Konaklioglu, 2012).

Everybody is at danger for food-borne illness, but there are sure individuals who are at more serious danger than others. Children, pregnant women, elderly, and those with compromised immune systems are at an expanded danger to illnesses connected with food. Additionally included are food-insecure individuals and those living in undesirable conditions as a result of poverty (Alaimo et al., 2001).

Food handler is any individual who handles food, or contact with any utensils or equipment that are likely to be in contact with food, for example cutlery, bowls, plates or chopping board (Tessema et al., 2014). The role of food handlers, normally mothers in guaranteeing food safety at the household level is very much acknowledged and an understanding

of the interaction on prevailing safe food handling knowledge, beliefs and practices of food handlers in order to minimize food borne outbreaks required (Medeiros et al, 2004).

Aim of the Work

The aim of this work is: 1- To determine level and sources of Knowledge of female teachers regarding safe food handling. 2- To assess their Attitude and Practice regarding safe food handling. 3- To evaluate the effectiveness of a health education program on Knowledge, Attitude, and Practice (KAP) of safe food handling among participants.

Materials and methods

- **Study design:** An interventional study.
- **Place and duration of the study:** This study was carried out in secondary school, in Zagazig district, Sharkia Governorates, Egypt, during the period from November 2015 to October 2016.
- **Study Sample:** The study sample was secondary school female teachers having the responsibility of food preparation at their homes. The sample size was calculated using

Epi info version 6 software program, using the following data: the mean of Knowledge about safe food handling after health education was 66.6 ± 16.5 , mean of Knowledge about safe food handling before health education was 49.3 ± 19.5 according to the results of a previous related study (Park et al., 2010), two sided confidence level (95.0%) and power of the study (80.0%), where the total sample size was (36). Taking into consideration 20% dropouts, the sample was 44 teachers. Only (42) teachers completed the study.

Zagazig district contains 27 secondary schools; one of them was randomly selected by simple random sampling.

Inclusion criteria: Female teachers working in the chosen secondary school, available during the period of the study, and willing to participate in the study were incorporated.

Exclusion criteria: Female teachers who refused to participate.

Pilot study: For testing the study tools, pilot study was conducted. It was carried out on 10% of the study sample

(5 female teachers) who were chosen randomly and excluded from the final analysis. According to the result of the pilot study, the questionnaires were assessed regarding order of questions, simplicity and language.

Validity and reliability: The all questionnaires were translated into Arabic; validity test to the questionnaires was done for language clarity, content, relevancy, ease of understanding and time needed to answer. Reliability test was done by using the reliability coefficients (Cronbach's alpha) which was high for all questionnaires, and suitable for scientific purposes.

- Study method:

A) A Semi-structured questionnaire; including the following sections is used to collect information from all participants:

I- Section one: Personal and socio-demographic data: Age, residence, marital status, and sources of knowledge about safe food handling and frequency of food related illnesses among their house-hold during the last three months.

II- Section two: Knowledge and attitude towards safe food handling:

A modified self-administered questionnaire which was developed by the researchers as per the research objectives, the literature reviews, and previously validated relevant study (Fawzi and Shama, 2010, and Farahat et al., 2015). It was divided into five main sections:

1. Purchasing and storage (12 items): included questions about purchasing and storage of different types of raw and cooked food, and microorganisms' growth, destruction and multiplication time.
2. Food preparation (4 items): included questions about different causes of food poisoning during preparation as thawing and refreezing of frozen food, using the same cutting boards, keeping prepared salad.
3. Food cooking (5 items): included questions about cooking quantities sufficient for one day, storage of food outside the chillers and causes of food poisoning during cooking.
4. Personal hygiene (8 items): included questions about safe food handling during illness, hand washing, clean nails and sources of food poisoning microorganisms.
5. Utensils and equipments (2 items) included questions about equipment which can be source of organisms and safest food contact surfaces.

All knowledge questions have three answers: Yes, No and I don't know. Right answer scored by giving one and zero for the wrong as well as to "I don't know".

Attitude questions followed the Likert scale: Strongly agree, Agree, Disagree and Strongly disagree. Satisfactory attitude was the sum of strongly agree and agree. However the rest of answers represented unsatisfactory attitude.

III- Section three: Safe food handling practice:

1. Purchasing and storage (4 items): Reading expiry date, Purchasing food of animal origin displayed refrigerated firstly purchased food are consumed first, and storage of cooked food in chillers.
2. Food preparation (5 items): Washing of vegetables, thawing frozen food, refreezing and using cutting boards.
3. Food cooking (9 items): Not consuming raw or half cooked

food, checking adequacy of cooking, leaving cooked food in the kitchen and storage in chiller, food quantities, reheating of foods and boiling of raw milk.

4. Personal hygiene (7 items):
Preparation while ill and hand washing
5. Utensils and equipments (2 items):
Cleaning and drying of equipment

The answers of Questions were (Often/Sometimes/No), scored from 0 to 2 respectively with higher scores for better practices.

IV- Section four: Program Evaluation Form

It was used to evaluate the outcome of the program from participants' point of views immediately after program implementation. It has included 13 different questions related the objectives, content of the program and the methods of training (Nasef et al., 2014).

Pre-intervention (Assessment phase) took about one month, where baseline KAP regarding safe food handling were assessed through a face-to-face interview with the teachers then

data were analyzed and used to guide designing the intervention.

Post intervention (Evaluation phase) emphasized on estimating the effect of the health education program through assessing outcome of the program through the program evaluation form and reassessing school teachers' KAP of safe food handling 3 months after the last health education session through a post-test questionnaire identical to preliminary questions in the pre-test.

The aggregate score of the overall safe food handling KAP was calculated by summing the scores of its five parameters. Satisfactory KAP scores were calculated if the participant got more than 60% of the total.

B) Health education program (Intervention phase):

The health education program included different audiovisual methods including Power Point presentation, role plays, videos, posters and handouts. They were prepared by the researchers for school teachers under the study. The objective of the health education sessions was to educate the participants in order to improve their KAP regarding safe food handling.

The participants were divided into 4 small groups to facilitate application of the training program. The training was conducted by the researchers through direct personal communication in teachers' workplace at the school library. They attended 5 sessions (30-45 minute each) in different days during a one-month period according to a health education topics plan: the 1st session about purchasing and storage of food, the 2nd for food preparation, the 3rd for food cooking, the 4th for personal hygiene and the last about utensils and equipment. Handouts of each session were disseminated to the participants at the end of the session to facilitate the process of remembering when needed.

Consent

A verbal consent was obtained from all participants of this study. The teachers were told about the aim of the study, and they were informed that the data would be used for scientific purposes only. They were also given

the right to refuse or participate in the study. Total confidentiality of any given information assured.

Ethical approval

Ethical considerations were respected. Official permissions were obtained from the Zagazig Educational Directorate, districts and administrators of the selected school.

Data management

The obtained results were coded and entered the computer where subsequent statistical analysis were done by using SPSS program version 19.0 (IBM, 2010). Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. The analyses were done using the appropriate statistical tests to test the significance of change post-intervention versus pre-intervention. The cut off point for statistical significance was P value <0.05.

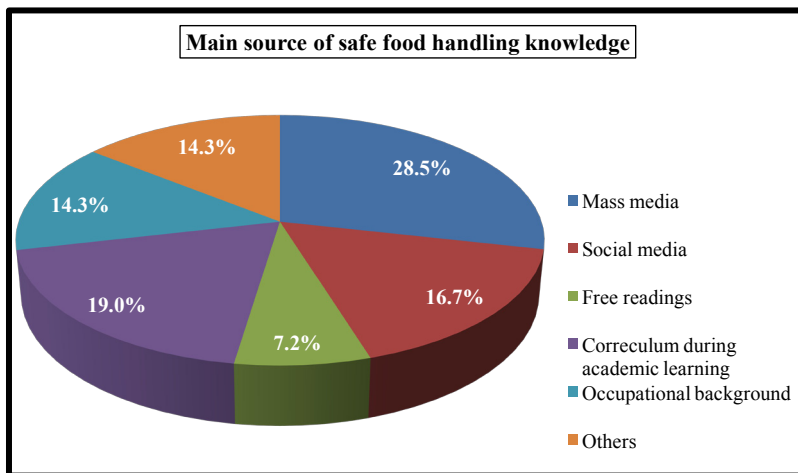
Results

Table (1): Socio-demographic characteristics of the studied teachers

| Socio-demographic characteristics | No =42 | % |
|-----------------------------------|------------|------|
| Age groups | | |
| <30 years | 7 | 16.7 |
| 30 – <40 years | 8 | 19.0 |
| 40 – <50 years | 15 | 35.7 |
| 50 –60 years | 12 | 28.6 |
| Mean ± SD | 34.2 ± 9.7 | |
| Range | 24 - 60 | |
| Residence | | |
| Urban | 9 | 21.4 |
| Rural | 33 | 78.6 |
| Marital status | | |
| Un-married* | 19 | 45.2 |
| Married | 23 | 54.8 |

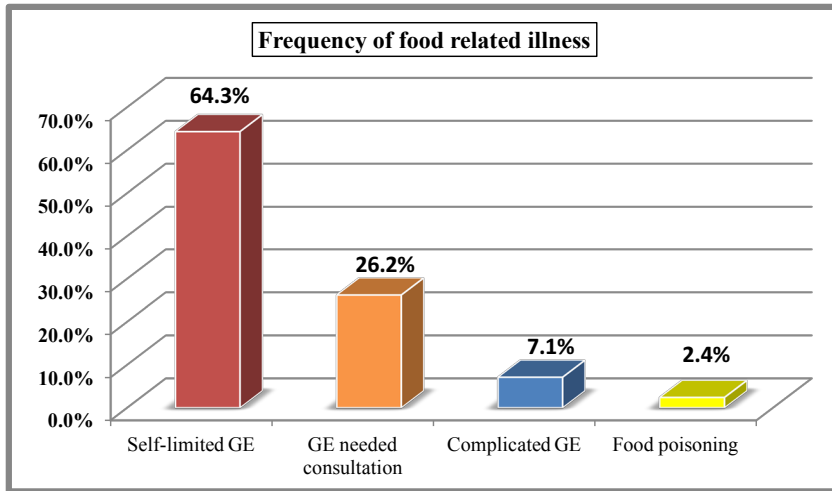
*Un-married including single, divorced, and widower.

Table 1 showed that the age of participants ranged from (24.0 - 60.0) with mean of 34.2±9.7. Most of them (78.6%) were from rural areas and more than half of them were married (54.8%).



Graph (1): Main source of teachers’ knowledge about safe food handling.

Graph 1 showed that the majority of teachers gained their safe food handling knowledge from the mass media. While, free reading was the least common source of knowledge (7.2%).



GE: self-limited gastroenteritis

Graph (2): Frequency of food related illnesses among teachers' household personnel during the last three months.

Graph 2 showed that self-limited gastroenteritis (GE) (64.3%) was the prominent complaint among households during the last three months.

Table (2): Participants' Knowledge, Attitude, and Practice (KAP) (Mean \pm SD) about safe food handling (pre/ post Intervention)

| KAP Mean \pm SD | | Pre-test | Post-test | p value |
|----------------------|------------------------|-------------------|-------------------|---------|
| | | Mean \pm SD | | |
| Knowledge | Purchasing and storage | 63.06 \pm 10.43 | 91.74 \pm 13.46 | <0.01** |
| | Preparation | 65.43 \pm 11.65 | 92.54 \pm 14.44 | <0.01** |
| | Cooking | 64.55 \pm 8.05 | 90.83 \pm 11.43 | <0.01** |
| | Personal hygiene | 66.43 \pm 10.35 | 93.09 \pm 13.86 | <0.01** |
| | Utensils and equipment | 64.35 \pm 9.15 | 91.22 \pm 13.47 | <0.01** |
| Attitude | Purchasing and storage | 58.72 \pm 9.32 | 81.32 \pm 13.07 | <0.05* |
| | Preparation | 59.22 \pm 10.07 | 82.63 \pm 12.48 | <0.05* |
| | Cooking | 55.05 \pm 10.39 | 81.22 \pm 12.74 | <0.05* |
| | Personal hygiene | 59.19 \pm 9.21 | 80.27 \pm 14.32 | <0.01** |
| | Utensils and equipment | 55.79 \pm 11.58 | 83.20 \pm 13.26 | <0.05* |
| Practice | Purchasing and storage | 42.17 \pm 8.46 | 44.89 \pm 11.59 | <0.05* |
| | Preparation | 46.65 \pm 9.67 | 50.43 \pm 10.43 | >0.05 |
| | Cooking | 47.55 \pm 11.55 | 46.54 \pm 10.44 | >0.05 |
| | Personal hygiene | 46.12 \pm 10.78 | 49.74 \pm 12.46 | >0.05 |
| | Utensils and equipment | 43.77 \pm 10.43 | 42.78 \pm 12.93 | >0.05 |
| Total KAP | Purchasing and storage | 62.72 \pm 11.73 | 70.32 \pm 12.12 | <0.05* |
| | Preparation | 61.21 \pm 10.24 | 71.02 \pm 13.25 | <0.05* |
| | Cooking | 60.21 \pm 8.71 | 73.28 \pm 11.21 | <0.05* |
| | Personal hygiene | 62.81 \pm 11.09 | 74.27 \pm 12.71 | <0.05* |
| | Utensils and equipment | 61.35 \pm 9.15 | 71.25 \pm 12.92 | <0.05* |

* Statistically Significant (p<0.05).

** Highly statistically significant (P<0.01).

Table 2 showed that knowledge, attitude and practice (Mean \pm SD) of five items regarding safe food handling were identified. Knowledge about safe food handling had highly significant improvement (p<0.01) after intervention especially in the item of purchasing and storage in comparison to the item of personal hygiene which had the highest knowledge score before intervention. As regards Attitude; it was significantly changed after intervention (p<0.05) especially in the item of safe food cooking. However, the level of Practice was not changed after intervention (p>0.05).

Table (3): Participants' Satisfactory Knowledge, Attitude, and Practice (KAP) scores about Safe food handling (pre/ post Intervention)

| KAP scores | | Pre-test No. (%) | Post-test No. (%) | p value |
|------------------|-----------------------|---------------------|----------------------|---------|
| Knowledge | Satisfactory | 13 (30.9) | 34 (80.9) | <0.01** |
| | Unsatisfactory | 29 (69.1) | 8 (19.1) | |
| Attitude | Satisfactory | 11 (26.2) | 29 (69.1) | <0.01** |
| | Unsatisfactory | 31 (73.8) | 13 (30.9) | |
| Practice | Satisfactory | 8 (19.1) | 11 (26.2) | >0.05 |
| | Unsatisfactory | 34 (80.9) | 31 (73.8) | |
| Total KAP | Satisfactory | 11 (26.2) | 28 (66.7) | <0.05* |
| | Unsatisfactory | 31 (73.8) | 14 (33.3) | |

* Statistically Significant ($p < 0.05$).

** Highly statistically significant ($P < 0.01$).

Table 3 showed that there was a highly significant improvement in knowledge level after intervention ($p < 0.01$), and significant improvement in attitude evaluation ($p < 0.05$). As regard practice; there was non-significant improvement after intervention ($p > 0.05$). Generally, the total KAP level was significantly improved after intervention ($p < 0.05$).

Discussion

Ensuring safe food handling at the household level is well accepted and clarifying the status of the safe food handling knowledge and practices is needed (Fawzi and Shama, 2009). Therefore this study was intended to determine the level of Knowledge, Attitude and Practice regarding safe food handling among secondary school female teachers before and after an educational program.

This study was conducted on 42 female teachers with mean age 34 years old, mostly from rural residence and married (Table 1). Choosing female teachers carried two points of strength: the first most of them were married and responsible for safe food handling and safety at their homes, the second point they are teachers and may spread the right information about this important topic to their students.

Mass media campaigns can reach large numbers of people. There is evidence that comprehensive programs which include mass media campaigns can be effective in raising knowledge and even improving behavior (Bala et al., 2013). This was reflected in our

study, which revealed that the mass media (28.5%) was the main source of knowledge about safe food handling among the participants (Graph 1).

According to WHO, every year, more than one-third of the total population in developing countries is affected by food borne diseases (Al-Shabib, 2015). Food-handling practices play an important role in the spread of viral infections, which have been blamed for many outbreaks of gastroenteritis (GE) in recent years. The main risk factor for contracting a viral infection is contact with someone with GE. Also, in households, food-handling hygiene is an important factor in transmission (de Wit et al., 2003). So, the impact of food-handling hygiene can be partly explained by food contamination that occurs when a sick household member prepares meals. That was noticed in our study, where increased self-limited gastroenteritis (GE) among teachers' household during the last three months (64.3%) (Graph 2) pointed to high morbidity and seriousness of the problem.

Three factors are playing fundamental role in food poisoning

outbreaks concerning food handlers: knowledge, attitude and practice (Sharif and Al-Malki, 2010). KAP of five items regarding safe food handling were evaluated in Table 2. Knowledge about safe food handling was significantly improved after intervention especially in the item of purchasing and storage in comparison to the item of personal hygiene which had the highest knowledge score before intervention. This may be explained by that the item of purchasing usually depend upon the food availability in markets and as a developing country with limited income and rural residence they don't have the welfare of choosing food. In consistence with these results (Salim, 2014) found the most sufficient knowledge score were in items of washing hands before food preparation (72.2%) and watching expiry dates (77.6%). However, the least knowledge score was in the item of thawing of frozen food was mostly (77.6%) carried out at room temperature and only 10.0% used the refrigerator. In another study done by (Khairunnisak, 2009) he noted in purchasing knowledge and behavior that most of participants who purchase condiment had no information about their safety

(e.g. ketchup, monosodium glutamate etc). The knowledge about food storage especially meat and dairy products took the highest score in (Redmond, 2002) and (Badrie et al., 2006) studies. Moreover, participants in previous studies of (Mitakakis et al., 2004) and (Li-Cohen et al., 2002), didn't know the correct methods of meat storage and the importance of separating it from other food stuffs. In contrast, Sanlier (2010) detected that the following knowledge are not known: A thermometer should be used to check red and white meats. Raw meat, chicken and fish should not be in contact with each other. Moreover, Zhang et al. (2005) found that the least knowledge score was in not being aware that salmonella and hepatitis can cause food borne illnesses.

As regards Attitude it was significantly changed after intervention especially in the item of safe food cooking (Table 2). The least scored attitude in (Turnbull and Badrie, 2014) study was in the step of preparation, as many participants believed that it was "very safe" to only rinse cutting boards (used for raw chicken/meat and fish) and defrost foods outside the

refrigerator. Additionally 25% believed that it was “safe” to leave hot foods at room temperature for more than four hours.

However, Practice was not changed after intervention (Table 2), that may be attributed to that changing behavior need longer time and more practicing of the right knowledge. This may be consistent with USDA-FSIS (2002) who reported that consumers may have good knowledge level about safe food handling, but not always reflected in their safe food handling behaviors. Afifi and Abushelaibi (2012) noted that the most commonly followed safe food practice among their participants was washing hands before safety food and eating. However, Dharod et al. (2004) commented that hand washing techniques were ineffective. Moreover, Anderson et al. (2004) found that the most safe food handling behaviors were avoid placing raw meat above ready-to eat foods in the refrigerator, and always separating raw meat from other food stuffs when placing it in the grocery cart. Additionally, Norazmir et al. (2012) observed that the least un-followed safe food practice was hand washing

and prevention of cross contamination from raw meat. Sanlier (2009) clarified that 10.5% of consumers who go to do shopping read storage conditions on package labels. Yasemin et al. (2013) noted that most of participants almost always put milk bottle into the fridge after drinking. Brewer and Rojas (2008) found good level of safe practice in the items of storing cooked or raw chicken and meat in the refrigerator for no more than four days before use.

Significant rise in the satisfactory level of Knowledge and Attitude was noticed after educational program in contrast to un-significant change in Practice level (Table 3). Adesokan et al (2015) noted significant change in knowledge and practice of safe food handling but with repeated short term training. MacAuslan (2002) and Worsfold et al. (2004) revealed that area of education did not have any significant association with the knowledge and practice levels.

At the end of the intervention, evaluation of the program outcome from teachers’ opinion (post-interventional questionnaire of satisfaction) revealed significant satisfaction with training

materials, aids, duration and meeting their expectations. The higher levels of satisfaction were reported for Training methods (97.6%), Meeting trainees' expectations (97.6%), and Training aids (95.2%), while lowest level was for Lectures' duration (73.8%) (Data not tabulated).

Increasing awareness about safe food handling requires more attention and researches especially in developing countries where food transmitted diseases represents a burden on public health.

The item of safe food handling was not clear as most of people believe that it is just washing food stuffs, so more detailed education about all steps of safe food handling is mandatory.

Conclusion and recommendations

Generally, it was observed that the majority of the respondents had unsatisfactory level of total Knowledge, Attitude and Practice about safe food handling, both Knowledge and Attitude improved markedly after intervention with statistical difference especially in the knowledge about the item of purchasing and storage, and attitude about safe food cooking

in contrast practice was not changed with no statistical difference. Thus we recommend that: 1-Safe food handling training should be propelled to women and repeated at particular intervals to guarantee that learnt data is put into the day by day life practices. 2-The data picked up by this study can be utilized to detail crucial messages for educational program.

Limitations of this study: Safe food handling practices were evaluated through self-reporting. Self-reporting more often overestimates the right practices; also some of the female teachers refuse to participate.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding

This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector.

Acknowledgement

The authors are thankful to all female teachers for their participation in the study.

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