Original Article

Journal of Food Safety and Hygiene

Journal homepage: http://jfsh.tums.ac.ir

Knowledge, attitudes and practice of food services staff on food hygiene at Tabriz University of Medical Sciences, Iran

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ARTICLE INFO

Article history:
Received 17 Mar. 2020
Received in revised form
28 May. 2020
Accepted 13 Jun. 2020

Keywords:
Awareness;
Attitudes;
Practices;
Food services staff;
Food hygiene;
Food-borne illnesses

ABSTRACT

Food hygiene must be observed in production, storage, supply, and sales to obtain healthy foods with desirable quality. The purpose of present study was to evaluate the awareness, attitudes, and practices of Tabriz University of Medical Sciences food services staff toward food hygiene. A questionnaire consisting of 46 questions was completed by 40 food services staff from February to March 2019. Based on the results, respondents had an acceptable awareness (92.5% to 100% general sanitary awareness and 37.5% to 95% awareness about microbial food hazards), excellent attitudes (97.5% to 100%), and moderate practices regarding food hygiene (17.5% to 97.5%). Although all participants had a relatively high level of awareness and attitude and participated in food safety education courses, their practices were somewhat poor.

Citation: Zolfaghari Firouzsalari N, Khezerlou A, Zolfaghari H, Shahmahdi N, Alizadeh-Sani M, Mahmoodi Z. **Knowledge, attitudes and practice of food services staff on food hygiene at Tabriz University of Medical Sciences, Iran.** J food safe & hyg 2020; 6(2):100-108.

1.Introduction

Food-borne diseases are extensive public health problems (1) affecting human health, especially in developing countries (2,3). They are responsible for a major part of illnesses and mortality worldwide (4).

It has been reported that up to 30% of individuals suffer from food-borne diseases in the industrialized world (5-7). According to the 2015 report by WHO, 10% of illnesses and 420,000 deaths occur annually owing to eating contaminated food.

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Based on this report, children under 5 years of age are at a higher risk, to such an extent that, every year, around 125,000 young children die from food-borne illnesses (8).

The incidence of food-borne diseases is related to a wide number of bacteria, viruses, parasites, and toxic chemicals (9). *Campylobacter spp.*, *Salmonella spp.*, and *Escherichia. coli* are common food-borne pathogens (7, 10). Studies have shown that bacteria, fungi, viruses, and parasites can cause food-borne illnesses, and humans can play a role in transmitting these microorganisms (7,10). In this regard, the most important causes of food-borne illnesses are long-term preparation of food, storage at inappropriate temperatures, cooling the food very slowly before placing it in the refrigerator, use of contaminated food, food cooking at temperatures below 63°C, the presence of epidemic illnesses in the supply and distribution of food, food staff's failure to comply with hygiene, and the use of contaminated equipment (11).

Training programs are of great importance in enhancing the awareness of food handlers (10, 12), such that their education can be effective in the prevention and control of foodborne illnesses (13,14). The successful implementation of a plan based on HACCP principles will need employee education (15). Food contamination can occur at any step of the process of food production until consumption (8). Studies show that inappropriate handling, procurement, and storage of food can cause foodborne illnesses (10, 16, 17). On the other hand, hygiene practice, as well as appropriate cooking and processing, can reduce the risk of foodborne illnesses (3, 17). Three invoices of awareness, attitude, and practice (KAP) play a major role in the process of food intoxication (7, 18) Some studies such as those by Bou-Mitri et al. (2018), Ansari-Lari, Soodbakhsh, and Lakzadeh (2010); Martins et al. (2012); and Abdul-Mutalib et al. (2012) have also assessed awareness, attitude, and practice among food handlers, indicating the importance and necessity of conducting this type of assessment to obtain sufficient data for subsequent actions (4, 10, 17, 19). Therefore, the aim of this study was to survey the awareness, attitude, and practice toward food hygiene among food service staff in Tabriz University of Medical Sciences, Tabriz, Iran.

2.Materials and Methods

The present cross-sectional study was conducted among all food services staff (40 persons) in Tabriz University of Medical Sciences, Iran, from February to March 2019. In the three food services, all services (food preparation and cooking) were performed by the food service staff in the kitchens of university. Data were collected by a questionnaire that was previously used in similar studies (10). The administered questionnaire consisted of 46 questions, assessing demographic characteristics as well as the awareness, attitude, and practices about food hygiene. The questions on awareness were concerned with personal hygiene, food-borne illnesses, and specific food-borne illnesses. Respondents were requested to choose "True", "False", or "I don't know". Two unrelated questions about food-borne agents, hepatitis B virus (HBV) and AIDS, were added to assess the awareness of food services staff. Additional 63 intoxication were also included. In the attitude section, there were 11 questions about several hygienic actions for food safety, and

respondents were asked to express their opinions by choosing "Agree", "Disagree", or "Uncertain". In the last section of the questionnaire, practices of the foodservice staff were determined by their self-reported hygienic conducts. Ten questions were provided in this section, scored on a five-point scale: "Never", "Rarely", "Sometimes", "Often", and "Always" (10, 13).

Statistical analysis was performed using SPSS software (version 16.0, IBM; Armonk, NY, USA). Independent-samples t-test, Students' T, frequency, percentage, and correlation coefficient were employed for data analysis. Values were reported as mean ± SD (standard deviation) and differences were determined to be significant at $p<0.05$.

3.Results

Demographic characteristics of the participants were reported in Table 1. Out of 40 food services staff, 90% were male. The age range was 20 to 70 years, and most respondents aged between 30 to 59 years. Moreover, 87.5% of the participants had a secondary level of education and 12.5% had higher education. Also, 72.5% had worked for more than 10 years and 27.5% had worked between 2 to 10 years. Furthermore, 100% of the participants had attended health and food safety education courses which are organized by the Ministry of Health and Medical Education, Iran. Tables 2-4 summarize the results of awareness, attitudes, and practices of the respondents.

All the staff agreed that washing hands before work, using gloves during work, and proper cleaning and handling of instruments reduce the health risk of food contamination. Likewise, their answers to questions about taking leave from work due to skin and eye infectious illnesses were 100% and 92.5%, respectively. Their responses to specific food-borne illnesses are presented in Table 2.

Typhoid, Diarrhea, Brucellosis, *Salmonella* infections, Hepatitis A, *Staph* infection, and *Clostridium botulinum* were correctly answered by 57.5%, 80%, 65%, 80%, 72%, 60%, 85%, and 95%, respectively. However, 25% of participants believed that jaundice can be transmitted by food and 37.5% did not know the answer. Likewise, 97.5% did not know that the correct temperature for the refrigerator is 4ºC.

Table 1. Characteristics of food service staff in Tabriz University of Medical Sciences, Tabriz, Iran

Variable	Variable levels	Frequency	Frequency (percent)	Awareness mean±SD	Attitude mean±SD	Practice mean±SD
Gender	Male	36	90	1.408±0.27	1.00±0.0	3.93±0.14
	Female	4	10	1.411±0.21	1.00±0.09	3.93±0.21
age	20-29	1	2.5	1.15±0.36	1.00±0.0	3.1±1.72
	30-39	12	30	1.42±0.21	1.00±0.10	3.95±0.21
	40-49	12	30	1.40±0.22	1.00±0.10	3.86±0.22
	50-59	13	32.5	1.40±0.21	1.00±0.10	3.96±0.20
	60-70	2	5	1.29±0.25	1.00±0.0	3.97±0.32
Working duration	Less than 2 years	0	0	0	0	0
	between 2-10 years	11	27.5	1.41±0.21	1.00±0.10	3.96±0.21
	more than 10 years	29	72.5	1.40±0.21	1.00±0.09	3.93±0.21
Section	high-school	35	87.5	1.40±0.21	1.00±0.09	3.93±0.21
	higher education	5	12.5	1.41±0.22	1.00±0.10	3.90±0.22
Passing courses related to health and food safety	Yes	40	100	1.40±0.21	1.00±0.09	3.93±0.20
	No	0	0	0	0	0

Table 2. Food services staff' awareness to food hygiene

Items	True	False	Do not know
Washing hands before work reduces the risk of food contamination	40(100)	0(0)	0(0)
Using gloves during work reduces the risk of food contamination	40(100)	0(0)	0(0)
Proper cleaning and handling of instruments reduces the risk of food contamination	40(100)	0(0)	0(0)
Eating and drinking in the work place increases the risk of food contamination	25(62.5)	1(2.5)	14(35)
All persons, including children, adults, pregnant women and old-ages are at equal risk for food poisoning	39(97.5)	0(0)	1(2.5)
Typhoid could be transmitted by food	23(57.5)	4(10)	13(32.5)
Jaundice could be transmitted by food	10(25)	15(37.5)	15(37.5)
Diarrhea could be transmitted by food	32(80)	3(7.5)	5(12.5)
AIDS could be transmitted by food	4(10)	29(72.5)	7(17.5)
Brucellosis could be transmitted by food	26(65)	2(5)	12(30)
Bloody diarrhea could be transmitted by food	32(80)	1(2.5)	7(17.5)
Abortion in pregnant women may be induced by foodborne disease	34(85)	3(7.5)	3(7.5)
Salmonella is among the foodborne pathogens	29(72.5)	1(2.5)	10(25)
Hepatitis A virus is among the foodborne pathogens	24(60)	4(10)	12(30)
Hepatitis B virus is among the foodborne pathogens	10(25)	17(42.5)	13(32.5)
Staphylococcus is among the foodborne pathogens	34(85)	0(0)	6(15)
Clostridium botulinum is amongst the foodborne pathogens	38(95)	0(0)	2(5)
The appropriate temperature for refrigerator is 4^0C	39(97.5)	1(2.5)	0(0)
During infectious illness of skin, it is essential to take leave from work	40(100)	0(0)	0(0)
During infectious illness of eye, it is essential to take leave from work	37(92.5)	3(7.5)	0(0)

Table 3. Food services staff' attitudes to food hygiene

Statements	Agree	Disagree	No idea
One of the most important responsibilities of the food handlers is...to food safety measure	40(100)	0(0)	0(0)
Using gloves is important in reducing risk of food contamination	40(100)	0(0)	0(0)
Using apron is important in reducing risk of food contamination	40(100)	0(0)	0(0)
Using masks is important in reducing risk of food contamination	40(100)	0(0)	0(0)
Using caps is important in reducing risk of food contamination	39(97.5)	0(0)	1(2.5)
Food handlers who have abrasions or cuts on hands should not touch foods without gloves	40(100)	0(0)	0(0)
Raw and baked foods should be stored separately to decrease risk of food contamination	40(100)	0(0)	0(0)
Food hygiene training for workers is an important issue in decrease risk of food contamination	40(100)	0(0)	0(0)
It is essential to check the temperature of the refrigerator periodically to decrease risk of food contamination	40(100)	0(0)	0(0)
The health status of the workers should be evaluated afore employment	40(100)	0(0)	0(0)
Foodborne illnesses can have deleterious health and economic effects on the society	40(100)	0(0)	0(0)

Table 4. Food services staff' practice on food hygiene.

Items	Never	Rarely	Sometimes	Often	Always
Do you use gloves during work?	0(0)	1(2.5)	1(2.5)	3(7.5)	35(87.5)
Do you wash your hands before using gloves?	0(0)	0(0)	2(5)	9(22.5)	29(72.5)
Do you wear apron during work?	0(0)	0(0)	0(0)	1(2.5)	39(97.5)
Do you use mask during work?	8(20)	8(20)	9(22.5)	8(20)	7(17.5)
Do you use cap during work?	0(0)	0(0)	1(2.5)	4(10)	35(87.5)
Do you wash your hands before you touch raw food?	0(0)	0(0)	3(7.5)	15(37.5)	22(55)
Do you wash your hands after you touch raw food?	0(0)	0(0)	3(7.5)	13(32.5)	24(60)
Do you wash your hands after rest time when you come back to work?	0(0)	1(2.5)	3(7.5)	15(37.5)	21(52.5)
Do you eat or drink in your work place?	8(20)	14(35)	11(27.5)	4(10)	3(7.5)
Do you smoke in your work place?	37(92.5)	0(0)	2(5)	0(0)	1(2.5)

4.Discussion

As it was found in our study, similar results have been obtained from studies by Al-Kandari in 2019, showing that food handlers had a lack of knowledge about the correct temperature for the refrigerator (20).

The results also indicated the acceptable awareness of food services staff at Tabriz University of Medical Sciences. Moreover, the majority of the staff had a high level of awareness about general hygiene at the workplace. Al-Kandari (2019), Ansari-Lari (2010) and Sani (2014) reported that participants gave more correct answers to questions about general hygiene (e.g. using gloves, washing hands, and wearing caps) at the workplace (10, 21). studies have reported that the contamination of food handlers' hands with microorganisms is a source of food contamination (22, 23). Hence, food safety is necessary for foodservice operations to decline food-borne illnesses. Numerous studies have concluded that bacteria are more effective in causing foodborne illnesses than viruses and parasites, and humans can somehow play a role in the transmission of these microorganisms. From among infections and food poisoning, Staphylococcal poisoning is very common, transmitted through hands and instruments during the process of food production and distribution. On the other hand, as this type of poisoning has a very rapid onset compared to other types of food poisoning (about 3-6 h), following the hygiene guidelines below can prevent food contamination with these pathogens: 1) maintaining food at suitable temperatures above 60°C (140°F) or below 5°C (14°F), 2) avoiding secondary contamination of cooked foods by raw foods or workers, 3) using the HACCP system, and 4) providing awareness and training for food center staff about food-borne illnesses.

In this study, 85% of the respondents had confirmed *Staphylococcus* is among the foodborne pathogens and 15% had chosen the option do not know, which reflects the high levels of awareness them in connection with this pathogen. Salmonellosis is another very common disease transmitted by food staff workers while they are unaware of it. Therefore, washing hands and wearing gloves, masks, and hats is mandatory for food staff workers to prevent the transmission of food-related illnesses (24). In this study, about 72% of the participants were aware of the connection between *Salmonella* and foodborne diseases.

Respondents had an acceptable level of awareness about pathogens related to food, but a few chosen the wrong choice in the identification of pathogens such as jaundice and hepatitis B or did not know about it. For instance, about one-third or more did not know that typhoid, jaundice, brucellosis, and hepatitis B are pathogens related to food. Consequently, special training courses on illnesses and pathogens related to foods are required for food service staff. They also need to have sufficient awareness on food hygiene to be able to apply this awareness during food procurement. Some studies reported that respondents did not have enough awareness about pathogens related to food (10, 13, 21) whereas participants in this study had a higher level of awareness regarding food-related pathogens.

All respondents agreed that one of the most significant responsibilities of food handlers is acting toward food safety. All of them also stated that the use of gloves, masks, aprons, and a periodical check of the temperature of the refrigerator decreases the risk of food contamination. Nevertheless, participants had relatively poor practices (10, 17, 25). Moreover, 2.5% of

them disagreed that the usage of caps is essential in diminishing the risk of food contamination (Table 3).

Ten questions were asked from food workers to evaluate their food hygienic practices. The results (Table 4) indicated that actions related to wearing gloves, washing hands before using gloves, and wearing aprons during work were reported by 87.5%, 72.5%, and 97.5%, respectively. Studies have concluded that hand washing can diminish the risk of diarrhea in child care institutions (26) as well as schools and universities. In this study, 55% of respondents had confirmed that always washing your hands before you touch raw food. The use of gloves with appropriate hand washing can also curb the risk of cross-contamination (27). Only 17.5% of the food services staff reported that they evermore wear masks, and 22.5% stated that they sometimes wear masks during work. Furthermore, almost 92.5% of respondents reported that they never smoked in the workplace. The results demonstrated that, although all participants had a relatively high level of awareness and attitude and had participated in food safety educational courses, their practices were relatively poor as was also found in studies in Italy, Iran, and Turkey (13, 28, 29). There is, therefore, a need to recognize the weak points of educational courses and assess the proper functioning of the HACCP system. A study conducted by Bou-Mitri in Lebanon among food handlers in hospitals showed that overall KAP scores were significantly higher among those who had been working for more than 21 years (4). According to Al-Kandari et al. food handlers generally show very good practices, but that had a few areas of poor practice, include cross-contamination as well as time and temperature control (20).

There was no meaningful difference between attitudes and practices (P=0.481, Rs=0.253), attitudes and awareness (P=0.340, Rs =0.318), and awareness and practices (P=0.110, Rs=0.536). Considering the result (P=0.000, Rs =0.951) and since respondents with 3-year and 2-year job duration responded in the same way regarding their practice, there was no correlation between performance and work experience which may have been owing to the small number of participants.

5.Conclusion

Regarding the importance of hygiene and food safety, those who involved in food preparation, should be aware of the fundamental principles of food hygiene and the basic nutritional skills and preventive role in food-borne diseases, knowledge, and training of food staff about foodborne diseases. The results of the study showed that food services staff had good knowledge and attitude, but their practice were low towards food hygiene.

Conflict of interest

Authors have no conflict of interest.

Acknowledgements

We appreciate the collaboration of food services staff in this study. The present study was funded by Tabriz University of Medical Sciences, Tabriz, Iran.

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