



## Food Safety and Hygiene Knowledge and Attitudes among the Health-Care Staff in the Southeast Area of Iran

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### ABSTRACT

**Background:** This study aimed to determine the level of knowledge and attitude towards food safety and hygiene among the health-care staff in Rafsanjan University of Medical Sciences, Iran. **Methods:** This survey-descriptive was conducted on 101 staff working in primary health-care centers of Rafsanjan University of Medical Sciences who were selected taking a census. Data collection was also performed by a researcher-made questionnaire. **Results:** The results showed that the mean score of knowledge and attitude of the staff was  $13.36 \pm 2.44$  and  $37.19 \pm 3.74$ , which obtained 70.31% and 74.38% of the total score, respectively. The lowest level of knowledge towards food safety and hygiene among the staff was about the reuse of foods, such as cheese (solid), jam, yogurt, tomato paste (liquid), as well as the need to store some foods refrigerated. The mean score of knowledge in the subjects with a history of food poisoning was also lower, which was statistically significant ( $P = 0.03$ ). The most common wrong attitudes among the staff included rinsing vegetables in sufficient water (85.1%), putting raw and cooked foods together (82.2%), and using foods in bulging cans (75.2%). However, the staff's attitudes regarding personal hygiene were appropriate. **Conclusion:** Finally, education about correct food storing and reusing, correct washing and consuming of raw foods and vegetables is recommended.

**Keywords:** Food safety; Food hygiene; Knowledge; Attitude; Healthcare staff

### Introduction

Food-borne diseases are the most important problems related to health and economic in today's world. Therefore, food safety and hygiene is a critical issue in developing and industrial countries (Baser *et al.*, 2017, Moreb *et al.*, 2017). Food safety and hygiene includes the control of

physical, chemical, and biological hazards related to farm-to-table foods (Barjaktarović-Labović *et al.*, 2018).

Today, food poisoning caused by consuming unsafe food is significantly increasing and it can have adverse effects on public hygiene and health

(Taha *et al.*, 2020). According to the world health organization (WHO), more than 600 million food-borne diseases and more than 420 thousand deaths occur in the world each year (World health organization, 2015b). In European Union (EU) countries, annually, 33 million people are infected with food-borne diseases and 5,000 of them die (World health organization, 2015a). Developing countries, especially in the middle east, are more at risk of food-borne diseases due to restrictions on surveillance and control systems (Taha *et al.*, 2020, WHO, 2015). Annually, more than one-third of the world's developing population are infected with food-borne diseases (Al-Shabib *et al.*, 2016). The most common causes of food-borne diseases include inadequate cooking, insufficient heating, long time between food preparation and consumption, improper storage, inadequate washing of equipment, and contaminated raw materials (Baser *et al.*, 2017). Therefore, three factors which play an important role in the prevalence of food-borne diseases include people's knowledge, attitude, and behavior or performance (Al-Shabib *et al.*, 2016). Any lack of knowledge, attitude and inappropriate performance about the preparation, transportation, and consumption of food can increase the risk of food-borne diseases from the producer to consumer (Huang *et al.*, 2017, Lange *et al.*, 2016).

The staff of primary health-care centers play an important role in improving the knowledge and attitude of the society, which can lead to the correct behavior about food safety and hygiene (Irani *et al.*, 2015, Ovca *et al.*, 2018). Therefore, educational activities that lead to behavior changes are a significant strategy in reducing foodborne diseases; however, in most cases, due to low knowledge, these activities do not lead to a change in attitude or behavior (Baser *et al.*, 2017, Ovca *et al.*, 2018). Lack of necessary knowledge and attitude about food safety and hygiene is a very important gap among health-care staff which can have irreparable effects on the society behavior. Thus, this study aimed to determine the level of knowledge and attitude towards food safety and hygiene among the health-care staff of Rafsanjan

University of Medical Sciences.

## Materials and Methods

*Research design:* This survey-descriptive and cross-sectional study was conducted from May to December 2019 in Rafsanjan, southeast of Iran. In this study, 101 staff of primary health-care centers of Rafsanjan University of Medical Sciences (7 urban primary health-care centers) were participated taking a census method. The researcher referred to the primary health-care centers and the questionnaire was completed by the centers' staff.

*Measurements:* Data collection was conducted by a researcher-made questionnaire used in previous studies (Eslami *et al.*, 2015), the reliability and validity of which were confirmed by Cronbach's content (0.74) and relevant specialists. The questionnaire included demographic, knowledge (19 Qs), and attitude (10 Qs) questions. The correct answers to each knowledge question were scored 1 point, and incorrect and unanswered answers were scored 0 point, which in total the score range of knowledge questions was from 0 to 19 (Razeghi *et al.*, 2018, Safari *et al.*, 2018, Sayuti *et al.*, 2020, Taha *et al.*, 2020). Attitude questions were also in the form of Likert scale, including completely disagree (score 1), disagree (score 2), no idea (score 3), agree (score 4), and completely agree (score 5), and the total range of which was from 10 to 50 (Al-Kandari *et al.*, 2019, Baptista *et al.*, 2020, Kwol *et al.*, 2020, Ma *et al.*, 2019, Ovca *et al.*, 2018, Safari *et al.*, 2017, Zanin *et al.*, 2017).

*Ethical considerations:* This study is the result of a research project which approved by Rafsanjan University of Medical Sciences with the ethics code of IR.RUMS.REC.1398.055.

*Data analysis:* After completing and collecting the questionnaires, the data were analyzed by SPSS18 statistical software using Mann-Whitney and Kruskal-Wallis nonparametric tests. The P-value<0.05 was considered statistically significant.

## Results

The results showed that out of the 101 staff of

primary health-care centers in Rafsanjan, 82.2% were females and 18.8% were males, and most of them (53.4%) were in the age group of 30 to 40 years. Moreover, 17.8% of the staff had a history of food poisoning (**Table 1**). **Table 1** shows the mean score of knowledge and attitude of health-care staff towards food safety and hygiene and its relationship with demographic characteristics of the participants. The results showed that the knowledge was  $13.36 \pm 2.44$ , which was 70.31% of the total score. The mean score of the staff attitude was  $37.19 \pm 3.74$ , which was 74.38% of the total score. The mean score of knowledge in the subjects with a history of food poisoning was lower and this relationship was statistically significant ( $P = 0.03$ ). However, there was no significant relationship between gender, age, and level of education with the mean score of the staff knowledge and attitude ( $P \geq 0.05$ ).

**Table 2** shows the percentage of correct answers given by health-care center staff to knowledge questions regarding food safety and hygiene. The knowledge level of the staff in most cases of food safety and hygiene was over 90%, such as paying

attention to food production and expiration date when purchasing, food poisoning and its symptoms, paying attention to fast-spoiling foods, such as milk or meat, and safety of bread consumption. However, the lowest knowledge level of the staff was about cheese hygiene and also moldy foods that are solid can be eaten by separating the moldy part as long as they are refrigerated, but foods, such as jam, yogurt, and tomato paste are no longer edible in case of mold.

The levels of the staff's answers to attitude questions in the field of food safety and hygiene are presented in **Table 3**. The most important wrong attitudes among the staff included rinsing vegetables only with water is enough (85.1%), putting raw and cooked foods together (82.2%), not discarding bulging cans (75.2%), food additives are not important in food safety, consuming traditional ice-cream and cheese has no problem (68.3%), storing pasteurized milk at room temperature for a day (64.4%), respectively. However, the staff's attitude in the field of personal hygiene was appropriate.

**Table 1.** The mean ( $\pm$ SD) score of knowledge and attitude of health-care staff about food safety and hygiene.

Variables	N (%)	Knowledge score (Rang 0-19)	Attitude score (Range 10-50)
Gender			
Male	19 (18.8)	13.47 $\pm$ 2.69	37.05 $\pm$ 3.29
Female	82 (82.2)	2.39 $\pm$ 13.36	37.23 $\pm$ 3.85
P-value <sup>a</sup>		0.31	0.21
Age (year)			
Less than 30	14 (13.9)	13.07 $\pm$ 2.36	37.38 $\pm$ 3.33
30 to 40	54 (53.4)	13.63 $\pm$ 2.34	37.33 $\pm$ 3.83
More than 40	33 (32.7)	13.12 $\pm$ 2.67	36.91 $\pm$ 3.88
P-value <sup>b</sup>		0.58	0.61
Educational level	4 (4)	13.01 $\pm$ 2.16	38.03 $\pm$ 4.24
Less than BSc	73 (73.2)	13.34 $\pm$ 2.48	37.32 $\pm$ 3.86
BSc			
MSc and higher	24 (23.8)	13.58 $\pm$ 2.44	36.66 $\pm$ 3.33
P-value <sup>b</sup>		0.41	0.45
Food poisoning history			
Yes	18 (17.8)	12.38 $\pm$ 3.25	36.61 $\pm$ 3.69
No	83 (82.2)	14.49 $\pm$ 2.24	37.32 $\pm$ 3.76
P-value <sup>a</sup>		0.03	0.46

<sup>a</sup>:Mann-Whitney test; <sup>b</sup>: Kruskal-Wallis test

**Table 2.** Knowledge questions about food safety and hygiene and true answers of health-care staff .

Knowledge questions	N (%)
1. Do you consider production and expiration date when you buy some foods?	101 (100)
2. Are fever and vomiting the symptoms of food poisoning?	91 (9.0)
3. Should the refrigerator temperature be below 5 °C?	65 (64.4)
4. Is botulism transferred through canned food?	92 (91.1)
5. Do botulism symptoms appear immediately after eating canned puffy?	51 (50.5)
6. Is refrigerator more suitable than storage cans?	26 (25.7)
7. Is there any need to use the refrigerator for storage of sterilized milk?	40 (39.6)
8. Does sterilized milk have preservative materials?	64 (63.4)
9. Can milk and meat be corrupted quickly?	97 (96.0)
10. Is minced meat corrupted faster?	75 (74.3)
11. Is the slimy surface of meat represented as the symptoms of rotten meat?	76 (75.2)
12. Is it true the use of healthy cheese that storage in the refrigerator and has passed its expiration date?	88 (87.1)
13. Is it true the use of moldy cheese if correction (removing the mold) and kept in the refrigerator?	5 (5.0)
14. Is it true the use of moldy tomato paste and jam if correction (removing the mold) and kept in the refrigerator?	85 (84.2)
15. Are plastic containers suitable for food storage in terms of health?	84 (83.2)
16. Is the use of plastic containers in the microwave correct?	89 (88.1)
17. Does Staphylococcus was entering in the food through that blisters on the hands and face and nasal mucus?	58 (57.4)
18. Is washing eggs before putting them in the refrigerator correct?	68 (67.3)
19. Is eating moldy bread correct?	97 (96.0)

**Table 3.** Frequency distribution of health-care staff answers to attitude questions in the field of food safety and hygiene.

Attitude questions	Agree	No idea	Disagree
1. Food safety and hygiene is an important issue	2 (2.0) <sup>a</sup>	2 (2.0)	97 (96.0)
2. It is necessary to wash your hands with soap and water before cooking.	4 (4.0)	2 (2.0)	95 (94.1)
3. Reheating food to ensure about its hygiene.	37 (36.6)	20 (19.8)	44 (43.6)
4. Discarding bulging cans.	17 (16.8)	8 (7.9)	76 (75.2)
5. Food additives are not very important in food safety	69 (68.3)	15 (14.9)	17 (16.8)
6. Raw foods can be placed next to cooked foods.	83 (82.2)	12 (11.9)	6 (5.9)
7. Pasteurized milk can be kept at room temperature for a day.	65 (64.4)	16 (15.8)	20 (19.8)
8. There is nothing wrong with putting bread in recycled bags.	97 (96.0)	1 (1.0)	3 (3.0)
9. Consuming traditional ice cream, milk, and cheese causes malaria.	17 (16.8)	15 (14.9)	69 (68.3)
10. Rinsing vegetables with water is enough.	86 (85.1)	4 (4.0)	11 (10.9)

<sup>a</sup>: N (%)

## Discussion

The level of knowledge and attitude of the health-care staff in this study was in appropriate status. In the study by Taha *et al.*, conducted on food safety knowledge among food handlers in food service in the United Arab Emirates, they showed that the level of knowledge in more than 70% of these individuals was appropriate, which is consistent with the results of the present study (Taha *et al.*, 2020). It is also consistent with studies conducted among the EU countries with 70.5%

(Smigic *et al.*, 2016) and Kuwait with 70% knowledge (Al-Kandari *et al.*, 2019). On the other hand, the food safety knowledge level of food handlers in Lebanese hospitals was 59.2% (Bou-Mitri *et al.*, 2018), in food services staff in the University of Camerino was 68.12% (Grappasonni *et al.*, 2018), and in food handlers in hotel kitchens in Turkey was 53.91% (Tuncer and Akoğlu, 2020), which were in line with present study. It can be concluded that the difference between the level of food safety knowledge in other countries is due to

the difference in the culture and customs of each area as well as the type and manner of training (Young *et al.*, 2020).

However, in this study, there was no significant relationship between demographic characteristics with the staff's knowledge and attitude. In several studies, the relationships between demographic characteristics of individuals and the level of knowledge and attitude about food safety and hygiene were not significant (Alqurashi *et al.*, 2019, Gruenfeldova *et al.*, 2019, Kunadu *et al.*, 2016, Woh *et al.*, 2016), which was consistent with the results of the present study. This could be due to the same conditions and position of respondents as the staff of primary health-care centers (Taha *et al.*, 2020).

The staff's knowledge was low towards foods needing to be refrigerated, such as the need to store sterilized milk refrigerated or it is better to store canned food in the refrigerator. Studies have shown that food storage temperature is a critical control point, and most studies have reported low knowledge towards food storage temperatures (Kunadu *et al.*, 2016, Osaili *et al.*, 2017, Zhang *et al.*, 2015). The study by Ovca *et al.*, on food safety knowledge and attitudes among professional food handlers showed that the knowledge was low towards food storage condition and temperature control (Ovca *et al.*, 2018). Osaili *et al.*, studied food safety knowledge in foodservice staff at the universities in Jordan and showed that the lowest level of knowledge score was related to the correct storing, cooking, and reuse of foods (53.5%) (Osaili *et al.*, 2018). It can be concluded that the importance of temperature in controlling food-borne pathogens by health-care staff in the present study was not well understood. Thus, it seems that the need for education with training towards these fields is required.

The most important wrong attitudes among the staff included rinsing vegetables only with water and putting raw and cooked foods together. However, the staff's attitude in the field of personal hygiene was appropriate. This finding is consistent with the study by Osaili *et al.*, on the level of food safety knowledge among Jordanian

university staff. In this study, personal hygiene (74.9%) and food-borne pathogens and their signs and symptoms of poisoning (74.3%) had the highest score on the level of knowledge. Moreover, the level of knowledge was low about correct washing and household disinfection methods (Osaili *et al.*, 2018). It seems that there is no adequate understanding towards eating raw foods risks, such as vegetables in communities. In another study, attitudes of food handlers were low in relation to the risks associated with food storage (Ovca *et al.*, 2018). In the study by Al-Shabib *et al.*, the knowledge and attitude of food handlers in restaurants towards personal hygiene and food storage temperature required training and promotion (Al-Shabib *et al.*, 2016). In the study by Jianu and Chiş, only 44% of the food handlers had the necessary knowledge about keeping raw and cooked food separately (Jianu and Chiş, 2012). In the present study, 82.2% of the subjects did not have proper knowledge and attitudes in this regard. The results of the present study explained the importance of training/retraining as an intervention tool for improving the level of knowledge and attitude towards food safety and hygiene among the staff of primary health-care centers. Many factors, such as training strategy, optional or compulsory participation in training, training location and level of work culture can be effective in training efficiencies and changing the attitude and behavior of health-care staff (Taha *et al.*, 2020).

The main limitation in this study was the low initial tendency to complete the questionnaire, which was solved with a full explanation of the importance of the study by the researcher. Moreover, investigating food safety behavior in health-care staff was suggested for future studies.

### Conclusion

This study evaluated the level of knowledge and attitude towards food safety and hygiene among the health-care staff in Rafsanjan, Iran by a researcher-made questionnaire. The assessment results showed that the knowledge level of health-care center staff in most cases of food safety and hygiene was over 90%, such as paying attention to

food production and expiration date when purchasing, food poisoning and its symptoms, and safety of bread consumption. There were wrong attitudes towards rinsing vegetables, proper storage, controlling raw and cooked foods, and using canned foods among the health-care staff. Thus, education with training/retraining is essential for improving the level of knowledge and attitude towards food safety and hygiene among the staff of primary health-care centers.

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### Authors' contributions

Eslami H, designed and conducted the research, wrote the original draft, reviewed, and edited. Nasirzadeh M, Nabizadeh F, Salari M and Alinaghizadeh Z, conducted the research, analyzed the data and wrote the original draft. Eslami H had primary responsibility for final content. All authors read and approved the final manuscript.

### Conflicts of interest

All authors declared that there are no conflict of interest

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