



Evaluation of knowledge, attitude, and practice of women about foodborne diseases: a cross-sectional study in Khuzestan, Iran

Zahra Golchinfar¹, Mahnaz Tabibiazar^{2*}

¹Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran.

²Faculty of Nutrition and Food Science, Tabriz University of Medical Sciences, Tabriz, Iran.

ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received 06 Jan. 2021 Received in revised form 19 Mar. 2021 Accepted 14 Apr. 2021</p> <p><i>Keywords:</i> Attitude; Knowledge; Practices; Food-borne disease; Women</p>	<p>Food-borne diseases are important globally because they cause significant death and treatment costs in the world. In this study, the researchers used a validated and trusted questionnaire to carry out this cross-sectional study of 384 women from Ahvaz, Khuzestan, Iran, recruited through stratified random selection. The main objective of the study was to examine the knowledge, attitudes, and practices of women (KAP) in Ahvaz, which played the main role in the preparation of food at home. Women exhibited a high level of KAP when it came to the most significant variables linked with food poisoning. The attitudes and practices of women, as well as their knowledge, were linked. Our findings revealed that the women in Ahvaz had a high degree of knowledge about how to protect themselves from food-borne illnesses; Some practices, however, posed a risk to food safety. More knowledge and training about the risks of consuming raw or semi-processed foods are required.</p>

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1. Introduction

Food safety and hygiene are important origins in the prevention of human diseases in the worldwide. According to World Health Organization (WHO), in both developed and developing countries, water and foodborne illnesses are a major issue (1).

Every year 600 million people worldwide become infected with consuming contaminated foods and as a result, 4200.000 people die (2). According to the Centers for Disease Control and Prevention (CDC), 325.000 instances of food-borne disease resulted in hospitalization, and 76 million people suffered from gastrointestinal disorders (3).

*Corresponding author. Tel.: +98 9143157721
E-mail address: mahnaz_tabibiazar@yahoo.com



The consumption of foodstuffs contaminated by bacteria, viruses, parasites, and their metabolites as potential food-borne pathogens, accounts about 250 various food-borne diseases (4,5). The major factors that contribute to these diseases include unsafe sources, inappropriate food storage, low personal hygiene, contaminated tools, inadequate temperature and cooking time (6). Unhygienic food preparation practices generate circumstances that increase the risk of sickness caused by microorganisms. As a result, increasing consumer awareness of proper food handling and preparation is a critical first step in resolving this issue (7,8).

A lot of these foodborne illnesses are linked to home cooking practices, according to studies (9,10). However, a lot of these foodborne illnesses can be avoided by following sanitary practices at every stage of food preparation and storage (11). Abatement cross-contamination from other dishes and foods, for example, as well as cooking conditions and temperature control, are all effective ways to decrease food-borne illness (12). In recent years, food-borne illnesses have appeared to be on the rise all over the world (13). On the other side, much recent research has focused on reducing risks during the manufacturing process, but no equivalent effort has been made to improve consumer food safety education (14). Diarrhea, fever, headache, vomiting, stomach pains, tiredness, and sometimes blood in the stool are frequent signs of these illnesses (15).

Because it is difficult to produce food without microbial contamination in the food industry, home food preparation and cooking are intimately connected to the prevention of food-borne illness (14). The prevalence of food-borne illnesses is 21% in families and 12% in the community, according to a research conducted in India, on mother's food safety awareness and behaviors. More than 90% of participants cleaned their hands before cooking, eating, or feeding their children, owing to the fact that more than 60% of cooked food was stored at room temperature (16). According to a research conducted in Turkey on food hygiene, food handlers at Turkish food establishments lack fundamental food hygiene expertise. As a result, it is critical to increase awareness and educate these individuals on proper food handling (17). A study on knowledge, attitude, and practices (KAP) among Tabriz women revealed a high degree of knowledge about food-borne illness prevention; yet, certain behaviors posed a risk to food safety (18). People knowledge of food hygiene is closely connected to their degree of education, according to a research on the KAP of food handlers in Malaysia (19). Talaei et al. conducted a research on people's KAP about the foodborne outbreak in Isfahan, Iran. They received that KAP are complementary to each other, respectively. Also, people need to be educated to increase their KAP about effective agents on foodborne outbreaks (20). Cheraghi et al. conducted a study on KAP related water and foodborne outbreaks in Yazd, and found that as knowledge improved, so did performance (21).

Many researches have been conducted on this subject, and they all conclude that home cooking is the key origin of food poisoning. These findings point to a knowledge gap in safety of food and the need to encourage food safety practices among certain target groups in society (22,23).

2. Materials and Methods

This study was done in a cross-sectional manner on 384 women in Ahvaz who were selected using a stratified random selection approach using the following formula:

$$N = \frac{z^2 p(1-p)}{d^2}$$

N show sample size, Z is the critical value (1.96), P is 0.5, and d is 0.05. The researchers created a dependable questionnaire that was utilized to collect data (18). Individual information about the participants was collected in the first part of this four-part questionnaire, which included their age, level of education, number of children, and whether or not they had completed courses on food safety and health, food poisoning, and economic condition. The respondents' knowledge of personal hygiene, pathogen food risks, and particular food-borne illnesses is examined in the second section. True, false, and no idea were the three alternatives for answering questions. The attitude questions were found in the third part of the questionnaire. There were fifteen closed-ended questions concerning food safety in this section. The questions were graded on a three-point scale (true, false, and no idea). Practices of Women were compared to their self-reported hygiene behaviors in the previous episode. In this section, twenty questions with possible solutions were created (yes, no).

SPSS software was used to perform descriptive statistics (mean, frequency, and percentage) as well as statistical tests like the Pearson's correlation coefficient and the Student's t-test (version 16, SPSS Inc., Chicago, IL, USA). For statistical trials, a significance threshold of 0.05 was used.

3. Results

Women in Ahvaz were filled out by Analyzable questionnaires. The demographic information of women are characterized in Table 1. A large number of participants were between the ages of 30-49, had an associate's degree, and were married. Furthermore, 54.7 percent of respondents had attended food safety training courses, whereas 41.3 percent had never attended any food safety training. Table 2 shows women's replies to questions on their knowledge of food-borne illnesses. According to the research, about 70.0 percent of women had well knowledge (answered correctly) on each of the 5 terms out of 50. These are: question number 1: 80.3%, question number 3: 83.5%, question number 4: 88.2%, question number 5: 91.7%, and question number 13: 90.0%. In addition, 55% of the participants had just a weak knowledge of three food-borne disease terms (answered wrong). These are: question number 11: 80.0%, question number 12: 55.0%, and question number 15: 44.7%.

Table 3 displays women's answers to the food-borne disease questionnaire's attitude-related part. More than 90.0 percent of participants had a favorable attitude (answered correctly) for each of the 15 expressions. These are question number 1: 100%, question number 2: 96.7%, question number 5: 93.3%, question number 6: 100%, question number 9: 100%, question number 11: 100%, question number 13: 96.7%, question number 14: 100%, and question number 15: 100%. Women gave incorrect responses to three negative phrases connected to food-borne illnesses. These are: question number 4: 33.3%, question number 7: 50.0%, and question number 10: 23.3%. Table 4 displays women's responses to the food poisoning questionnaire's practice-related section. In response to 15 of the 20 questions, 88.0 percent of the participants had well hygienic practice (answered properly). Only a few questions had a significant percentage of unsanitary practice replies (answered incorrectly). Question 11 received 26.7 percent "yes" responses, question 16 received 40.0 percent "yes" responses, and question 17 received 20.0 percent "yes" responses.

Table 1. Demographic information of women (n = 384)

Variable		Value
Age (year) [n (%)]	20-29	78 (20.0)
	30-39	153 (40.0)
	40-49	153 (40.0)
	50-59	0 (0)
	60-70	0 (0)
Education [n (%)]	< diploma	90 (23.3)
	Associate degree	128 (33.4)
	Undergraduate	115 (30.0)
	>Master	51 (13.3)
Marital status [n (%)]	Single	78 (20.0)
	Married	306 (80.0)
Number of children [n (%)]	0	104 (26.7)
	1-2	166 (43.3)
	3	104 (26.7)
	>3	10 (3.3)
Passing courses related to health and food safety [n (%)]	Yes	218 (54.7)
	No	166 (41.3)
Food poisoning [n (%)]	Yes	205 (53.3)
	No	179 (46.7)
Economic situation [n (%)]	No	179 (46.7)
	Low	78 (20.0)
	Middle	166 (43.3)
	High	140 (36.7)

Table 2. Results of women living in Ahvaz City, Iran, to knowledge section of questionnaire on food poisoning

Question statement	True [N (%)]	False [N (%)]	No idea [N (%)]
Food poisoning occurs by pathogenic microorganisms.	322 (80.3)	0 (0)	62 (19.7)
Some toxins produced by the microorganisms and causing food poisoning are resistant to heating temperature of food.	282 (73.3)	51 (13.3)	51 (13.3)
Drinking raw milk increases the risky food poisoning.	326 (83.5)	16 (4.5)	42 (12.0)
Eating raw eggs greatly increases the risk of food poisoning.	339 (88.2)	39 (10.1)	6 (1.7)
Eating raw and half-cooked meat greatly increases the risk of food poisoning.	362 (91.7)	22 (8.3)	0 (0)
Eating raw and unwashed vegetable greatly increases the risk of food poisoning.	294 (76.7)	51 (13.3)	39 (10.0)
Eating unwashed and not peeled fruits greatly increases the risk of food poisoning.	282 (73.3)	63 (16.7)	39 (10.0)
Food handlers with unhygienic practice could be the source of microbial contamination of the food, which causes food poisoning.	321 (83.3)	63 (16.7)	0 (0)
Well-cooked food is free from microbes, which cause food poisoning.	180 (46.7)	180 (46.7)	39 (10.0)
Eating uncovered leftover cooked foods, kept at room temperature for 12 to 24 h, is at the risk to cause food poisoning.	307 (80.0)	26 (6.7)	51 (13.3)
Raw white cheese produced from raw milk (not heated) has a risk of food poisoning.	210 (55.0)	96 (25.0)	78 (20.0)
The consumption of pasteurized milk drunk directly can cause a food poisoning.	205 (53.3)	101 (36.7)	39 (10.0)
Keeping food at refrigerator temperature will slow down the microbial growth and multiplication, thus prevents food spoilage and food poisoning.	345 (90.0)	39 (10.0)	0 (0)
Drinking surface water such as rivers, streams, and rainwater reservoirs without any treatment as boiling or chlorination is at high risk to cause food poisoning.	295 (76.7)	26 (6.7)	63 (16.7)
There is no risk of food poisoning from eating leftover cooked food kept in the refrigerator for 2-3 days.	166 (44.7)	130 (32.0)	89 (23.3)

Table 3. Results of women living in Ahvaz City, Iran, to attitude section of questionnaire on food poisoning

Question statement	True [N (%)]	False [N (%)]	No idea [N (%)]
Raw milk is healthier and more nutritious than pasteurized or boiled milk.	0 (0)	384 (100)	0 (0)
There is no risk for disease form drinking raw sheep or cow milk right after milking.	13 (3.3)	371 (96.7)	0 (0)
There is no risk for disease form drinking raw camel milk right after milking.	26 (6.7)	295 (76.7)	63 (16.7)
Raw eggs are healthier and more nutritious than cooked ones.	13 (3.3)	255 (66.7)	116 (30.0)
There is no danger of disease form eating raw eggs.	26 (6.7)	358 (93.3)	0 (0)
There is no danger of disease form eating raw meat of young animals.	0 (0)	384 (100)	0 (0)
Wiping fruits and vegetables makes them safe to be eaten.	192 (50.0)	192 (50.0)	0 (0)
There is no danger of disease from eating cooked food kept at room temperature for one day if covered.	13 (10.0)	358 (86.7)	13 (3.3)
There is no danger of disease from eating unwashed vegetables and herbs picked up directly form that plant.	0 (0)	384 (100)	0 (0)
Baby feces are free from pathogenic microbes if he/she is not sick.	0 (0)	294 (76.7)	90 (23.3)
Rainwater collected in reservoir is safe to drink without any process (such as chlorination and heating).	0 (0)	384 (100)	0 (0)
Food handlers without clinical symptoms can contaminate food with pathogenic microbes, which cause food poisoning.	255 (66.7)	51 (13.3)	78 (20.0)
Washing hands with soap and water before eating food is necessary to prevent food poisoning.	371 (96.7)	13 (3.3)	0 (0)
Thoroughly washing of vegetables and fruits by tap water is necessary to prevent food poisoning.	384 (100)	0 (0)	0 (0)
Washing hands with water and soap before preparing food is necessary to prevent food poisoning.	384 (100)	0 (0)	0 (0)

Table 4. Results of women living in Ahvaz City, Iran, to practice section of questionnaire on food poisoning

Question statement	Yes [N (%)]	No [N (%)]
Do you wash fresh fruits and vegetables in top water before eating?	345 (90)	39 (10.0)
Do you wash your hands with water and soap before eating your meal?	321 (83.3)	63 (16.7)
Do you wash your hands with water and soap before preparing and preparing food?	384 (100)	0 (0)
Do you wash your hands with soap and water after clearing or touching raw vegetables?	358 (93.3)	26 (6.7)
Do you wash your hands with soap and water after using the toilet?	358 (93.3)	26 (6.7)
Do you wash your hands after contact with the animals?	358 (93.3)	26 (6.7)
Do you consume fresh fruits and vegetables without washing?	51 (13.3)	333 (86.7)
Do you just wipe fresh fruits and vegetables before you eat them?	13 (3.3)	371 (96.7)
Do you pick up vegetables and plants when you are travel eat them without washing?	13 (3.3)	371 (96.7)
Do you consume raw eggs?	0 (0)	384 (100)
Do you eat half-cooked eggs (honey)?	103 (26.7)	281 (73.3)
Do you consume raw meat?	13 (3.3)	371 (96.7)
Do you consume half-cooked meat?	13 (3.3)	371 (96.7)
Do you drink raw cow or goat milk (not heated)?	26 (6.7)	358 (93.3)
Do you drink raw camel milk (not heated)?	0 (0)	384 (100)
Do you consume raw white cheese made from raw un-pasteurized milk?	154 (40.0)	230 (60.0)
Do you eat cooked food that has remained at room temperature for over 6 h without reheating?	76 (20.0)	308 (80.0)
Do you serve at the restaurant or cafeteria, which looks not clean?	0 (0)	384 (100)
Do you use rainwater or river that is collected and stored without any treatment (such as chlorination and heating) in reservoirs?	26 (6.7)	358 (93.3)
Do you eat food (such as meat, rice and soup) by hand form a large bowl shared for several people?	0 (0)	384 (100)

4. Discussion

Foodborne pathogen knowledge can help to reduce foodborne illness outbreaks and may be a valuable tool for proving safe food practices. Generally, the findings in the category of knowledge reveal that Ahvaz women are well informed about the main aspects related to food poisoning. They lacked the requisite expertise in a few areas.

For instance, 43 % of the women were unaware that consuming cheese made from unpasteurized milk has a high risk of food poisoning, underlining the important need for education in this field. In addition, 25% of women were unaware that certain pathogens are extremely stable at high temperatures processing in food. Furthermore, 58% were unaware of or had incomplete information about consuming meals that had been kept in the refrigerator for 2 to 3 days; they believed that these items could not be used. Haji Mohammadi et al. discovered similar findings (24). Several participants claimed that they were unaware even healthy persons have the potential to contaminate food. The women had a positive attitude to food-borne diseases. When it came to eating raw milk, raw eggs, raw meat, and fresh vegetables, people had an excellent mindset, but when it came to infant feces, 21.2 % had the incorrect mentality. The unfavorable attitude that women did not wash their hands after changing their kid's diapers may pose a significant risk (25,26); there was also the chance of germs being transmitted to both adults and infants' meals during feeding children. In the field of hand hygiene before eating and food preparation, the attitude was good. In this aspect, 48 percent of those polled were against simply washing fruits and vegetables to make them safe to eat. In terms of practice, 90 percent of participants said fruits and

vegetables should be cleaned before eating them. Soft-boiled eggs were favored by about 25% of women. Even though a lot of the participants claimed they avoided eating raw or half-cooked foods, some other participants indicated they were unaware that doing so may result in food poisoning. Around 40 percent of the participants consumed raw white cheese made from unpasteurized milk. According to Sharif and Al-Malki research, 50 % of students in Saudi college ingested raw white cheese and raw eggs (27) If cooked food is kept in the kitchen for an extended time, germs can grow and cause food poisoning (28). In this work, the majority of participants stated they didn't leave cooked items out of the fridge for lengthy periods. Many food-borne illnesses are caused by incomplete cooking and cross-contamination owing to low hand hygiene in food handling methods. In one meta-analysis study showed that handwashing with soap can reduce the incidence of gastrointestinal disease by 42 % to 47 percent and save people lives (29); in our work, 82 percent of participants cleaned their hands before consuming meals. In general, based on the responses to the questions in the knowledge and skill part, it can be inferred that there was a difference between food safety knowledge and practices. Food-borne illnesses can be caused by a lack of essential information as well as a gap of food safety understanding and procedures. Based on findings, there was a significant correlation between women's knowledge and their practice and attitude. In addition, there was a strong connection between attitude and knowledge, as well as the level of education, number of children, food poisoning, involvement in education courses, and financial status ($p < 0.05$). However, no significant link was found between women's attitudes

and knowledge and their age or marital status ($p > 0.05$). The findings revealed that women with a greater level of education had more knowledge and experience. Furthermore, a statistically significant difference was discovered in this study among behavior and attitude in relation to the risk of food poisoning, indicating that individuals who have suffered food poisoning have changed their attitudes in connection with the causes of food poisoning and help to improve their habits in order to avoid becoming sick. In general, we discovered that knowledge was influenced by demographics, understanding of potentially dangerous items, and food safety-related activities. As a result, raising people's understanding of the most common food-borne viruses might be a beneficial method to encourage safe food handling practices. Negative or positive or knowledge-practice connections, as well as substantial and minor ones, may be caused due to the fact that all existing research depends on self-reports rather than scientifically validated measures.

5. Conclusion

Hygiene is an important aspect of having a healthy lifestyle. To avoid infectious illnesses, it is important to cook and hygienically consume meals. We are now, more than ever, at risk of food poisoning and dangerous germs that have been proved to be highly deadly. We have to educate people on how to avoid these issues and how to struggle them with as many safety precautions as possible. In general, customers from all groups should be aware of key concepts of food safety assurance at home in order to maintain global food safety.

The findings revealed that women in Ahvaz had an excellent understanding of how to protect themselves from food-borne illnesses. However, there is a contradiction between some habits and food safety, for example, eating cheese made from raw milk. Therefore, more education and informing mothers about the dangers of eating raw or semi-processed foods, proper storage of food before consumption, cooking in a clean environment, washing and disinfecting dishes, cooking temperature is needed. Therefore, publishing books or magazines in this regard, broadcasting educational programs on social media such as television, or using social networks such as instagram for awareness people is very useful. Furthermore, increased education of women coming to medical centers on the signs of food-borne diseases and infections might enhance knowledge attainment and practice. Future research should focus on comparing the KAP of various cultures in connection to food-borne illnesses, as well as employing food safety teaching plans for mothers and analyzing the results of KAP before and after the teaching.

Conflict of interest

The authors declare there is no conflict of interest.

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