

FOOD SAFETY KNOWLEDGE AND THE SAFE FOOD HANDLING BEHAVIOURS OF FEMALE AND MALE CONSUMERS

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ABSTRACT

Objective: To observe the food safety knowledge of female and male consumers and to investigate the application of food safety.

Methodology: The study was conducted in Ankara, the capital of Turkey. One thousand and eighty male and 1064 female consumers (a total of 2144) were randomly selected for this study. Questionnaires were used with face-to-face interviews and the study was conducted from March to November 2008.

Results: Whereas the knowledge of food safety in males and females was similar, the practice of safe food preparation was at a higher level in females. While food safety knowledge scores were related to age and education levels, scores for safe food practice were related to age, education level and gender ($p < 0.05$).

Conclusion: Consumers need to learn about safe food handling procedures to maintain their health now and in the future. Males and females may have some knowledge of proper techniques and acceptable steps when it comes to food handling, yet this knowledge may not be fully shared with each other enough to have a significant impact on their behaviors/attitude in a positive manner.

KEY WORDS: Food safety, Food knowledge, Food practices, Consumers.

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INTRODUCTION

Foodborne diseases take a major toll on health. Millions of people fall ill and many die as a result of eating unsafe food. Contaminated food

has become one of the contemporary world's greatest hazards.¹ In response to the increasing number of foodborne illnesses, governments all over the world are intensifying their efforts to improve food safety.²

It is difficult to give the definitive figures for foodborne diseases around the globe since many cases are not recorded. It has been estimated that as many as one in 12 people suffer from foodborne diseases in the UK and the USA each year.^{3,4} A total of 84,340 and 77,515 cases of foodborne diseases were notified in 1999 and 2000 respectively in Turkey.⁵

Most cases of foodborne illness are preventable if food protection measures are followed through from production to consumption. As

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a result of the failure to observe sufficient food hygiene rules at home, foodborne illnesses occur amongst 50% and 87% of the world population.⁶ Studies indicate that a significant proportion of foodborne illnesses arise from poor practices in the kitchen at home.^{2,7} Consuming contaminated raw foods and not paying attention to food safety regulation during the preparation and cooking of food causes food contamination and foodborne illness in the consumers.⁸ Those who prepare food at home need to take many precautions to minimize pathogenic contamination of home-prepared food because they are the final line of defense against foodborne illnesses.⁹ Implementation of proper food-handling practices and thorough cooking procedures can prevent cases of foodborne disease, and how consumers prepare food in the kitchen affects the risk of pathogen multiplication, cross contamination of other products, and pathogen destruction.¹⁰

Many studies of consumers show that they are sensitive to the importance of food safety knowledge and its application. But there are many gaps in food safety knowledge and practice that may result in foodborne diseases.^{9,11} People of all ages seem to think that they know how to handle food safely, but their self-reported food handling behaviour does not support this self-belief. Foodborne illnesses have always been a major threat to vulnerable groups such as the young, the aged and the immunocompromised. Studies in adults have indicated that food safety knowledge tends to increase with age and practice; female have higher scores than males, and respondents under the age of 35 have shown the greatest need for additional food safety education.^{1,12,13}

This study explored the current level of food safety knowledge, safe food preparation practices among male and female consumers in Ankara, Turkey.

METHODOLOGY

A cross-sectional study was conducted from March to November 2008 on food safety knowledge, perceptions of food safety and the safety of the food handling behaviors of male and

female consumers. The research sample included 1080 male and 1064 female (totaling 2144) voluntary consumers.

Instrumentation: The research data was collected through a questionnaire and face-to-face interviews. The 21 item written questionnaire was modified from those of other researchers.^{11,14} The questionnaire was pilot tested resulting in minor modifications made to the wording of the questionnaire. The revised questionnaire was divided into three sections:

1. A demographic section.
2. Food safety knowledge (10 questions, vary from 0 to 10).
3. Safe-food-handling behaviors (11 questions, vary from 11 to 55).

Data Collection: The data was collected from consumers in shopping malls on weekdays and at weekends by the researcher. The objective of the study was briefly explained to the consumers by a researcher.

Data analysis: The data was analyzed with SPSS software (Statistical Package for the Social Sciences, version 11.0, SPSS Inc, Chicago, III USA). Mean and standard deviation values were used to evaluate the scores. They were also used, to correlate age, gender and the scores of food safety knowledge and safe food handling behaviors. Pearson chi square and t tests were used in the analysis of the food safety knowledge and safe food handling behaviors in terms of gender. Statistical significance was set at p values of < 0.05.

RESULTS

Of the participants 50.4% were male, 49.6% were female and the average age was 30.2± 13.1 years. Of consumers 12.8% were university students, 32.2% were housewives, 26.6% were civil servants, 14.7% were self-employed and 10.7% were unemployed.

Male consumers gave correct answers on different topics about food safety as follows: of the male consumers 84.6% know that it is important to keep to the use by date to make sure that milk is safe, 67.0% know that a high degree of heat is necessary to cook chicken safely, 73.6% know that pasteurized milk can be preserved for three days if the carton is kept closed (p<0.05).

Of the male consumers 11.9% and of the female consumers 15.2% stated that they never wash their hands before they start eating, of the male consumers 37.2% and of the female consumers 34.7% stated that they never use a towel for drying their hands ($p < 0.05$).

The food safety knowledge score of male consumers was 7.69 ± 1.63 , the score of female consumers was 7.67 ± 1.67 . The safe food handling behaviors score was 33.55 ± 7.72 in males and it was 34.34 ± 7.68 in females. While there were no statistically important differences between genders about the score for food safety knowledge, the differences in safe food handling behaviors were important ($t = 2.366$, $p = 0.018$). The safe food handling score of females was high ($p < 0.05$).

Important correlative differences were found between food safety knowledge and age ($r = 0.138$, $p < 0.001$), education level ($r = 0.208$, $p < 0.001$). There are correlative differences between the scores for safe food handling behaviors and age ($r = 0.426$, $p < 0.001$), gender

($r = 0.51$, $p < 0.05$) and education level ($r = 0.361$, $p < 0.001$), (Table- IV).

DISCUSSION

Changes in social attitudes and eating habits and changes in food production and distribution systems, increase in numbers of immunocompromised individuals, and improved pathogen-detection methods are some of the factors that have contributed to the emergence/recognition and persistence of foodborne pathogens.¹⁵ In a study 25% of reported food-poisoning outbreaks are caused by inappropriate food handling and preparation behavior in the home.¹⁶ At the Food and Agriculture Organization/World Health Organization Pan-European Conference on Food Safety and Quality 2002, it was reported that some 40% of foodborne outbreaks occurred in home.¹⁷ Redmond¹⁰ suggested that cases originating in the home were less likely to be reported. This emphasizes the need for greater food safety awareness at the consumer level.

Table-I: Distribution of correct answer on the knowledge questionnaire (n= 2144)

Statements	Male n (%)	Female n(%)	Total n(%)	χ^2	p
Keep clean					
1. It is enough to hold your hands under cold tap water before touching food so as to get rid of bacteria (-)	792(73.3)	823(77.3)	1615(75.3)	4.652	0.031*
2. Bacteria transmitted from hands to food can result in the growth of harmful microorganisms in food	1037(96.0)	950(89.3)	1987(92.7)	35.800	0.000**
3. If a cutting-board will be used to cut different types of food such as vegetables and meat, you should clean the board with a clean towel to prevent bacterial growth (-)	720(66.7)	754(70.9)	1474(68.8)	4.396	0.036*
Separate raw and cooked					
4. Raw chicken, fish and meat should not contact eachother	852(78.9)	827(77.7)	1679(78.3)	0.427	0.513
Cook thoroughly					
5. The safety way to control if meat has been cooked well is to check its internal with a food thermometer	580(53.7)	644(60.5)	1224(57.1)	10.184	0.001*
6. Internal temperature of chicken must be high for safe cooking	724(67.0)	685(64.4)	1409(65.7)	1.680	0.195
Keep food at safe temperatures					
7. Pasteurized milk can be stored at refrigerator temperature for a maximum of 3 days in its unopened box	795(73.6)	759(71.3)	1554(72.4)	1.393	0.238
8. The most suitable temperature (4-7 °C) at which bacteria grows is the temperature of the refrigerator(-)	898(83.1)	904(85.0)	1802(84.0)	1.316	0.251
Check foods					
9. You should test milk rather than look at its expiry date to understand if it is safe or not (-)	914(84.6)	860(80.8)	1774(82.7)	5.427	0.020*
10. It is wrong to eat tin food if the cover of the tin is bloated or light	997(92.3)	980(92.1)	1977(92.2)	0.033	0.856

* $p < 0.05$, ** $p < 0.001$

This study revealed that females were more engaged in food preparation at home, but males were more engaged in the food sector. Furthermore, of the consumers, 21.3% stated that they had experienced foodborne diseases. Badrie, et al.¹⁸ stated in their study that of reported food poisonings, 55% resulted from restaurant foods, 20% were from household foods, 5.5% were from food sold on streets.

Although females had the highest rate of right answers, the average score was similar (Table-I, Table-III). Females were more interested and well informed about food safety and practice.^{14,16} Griffith, et al.¹⁹ observed that consumers knew when and how to wash their hands, in a study observed that of the participants, 82% knew that it was vital to wash hands both before and during food preparation.²⁰ Bloomfield and Neal²¹

Table-II: Safe food handling behaviors of male and female consumer (%)

Practices	Never	Sometimes	Often	Almost always	Always	χ^2	<i>p</i>
Wash your hands							
I wash my hands before handling. preparing food or eating at home							
Male	2.1	9.3	23.1	39.5	26.0	6.48	0.262
Female	2.6	7.8	24.4	41.9	23.3		
I wash my hands before eating food in the school cafeteria/restaurant							
Male	11.9	26.2	26.8	23.6	11.5	38.56	0.000**
Female	15.2	29.5	18.7	26.2	10.4		
I dry my hands with a paper towel							
Male	37.2	32.1	14.4	7.4	8.9	12.71	0.026*
Female	34.7	29.5	15.9	10.6	9.3		
Separate raw and cooked foods							
I washed my hands between handling raw meat, chicken or fish and ready-to-eat foods							
Male	12.1	10.9	14.7	35.9	26.4	68.93	0.000**
Female	5.6	9.4	25.8	36.7	22.5		
I clean the surfaces with cleaners which consist chlorine after every use and before preparing food							
Male	13.7	8.4	24.4	27.2	26.3	84.96	0.000**
Female	4.4	6.6	26.5	39.3	23.2		
Keep food at safe temperatures							
I put the remaining food into the refrigerator within 2 hours							
Male	23.1	15.5	19.4	26.9	15.1	52.81	0.000**
Female	21.1	16.5	12.1	35.9	14.4		
I put the easy-to-spoil foods into the refrigerator as soon as I buy them							
Male	11.3	7.2	22.3	36.8	22.4	59.64	0.000**
Female	5.5	13.8	19.5	40.9	20.3		
Cook thoroughly							
I eat meat after cooked well, I do not consume rare meat							
Male	12.8	8.0	26.3	31.8	21.1	11.34	0.045*
Female	10.7	6.9	26.8	37.6	18.0		
I don't eat raw eggs or foods made from raw eggs							
Male	34.4	12.8	16.9	23.6	12.3	46.51	0.000**
Female	36.2	19.5	16.8	17.3	10.2		
Check foods							
I check the expiry date written on the food packages							
Male	9.7	32.0	23.2	15.6	19.5	115.18	0.000**
Female	11.8	17.3	18.0	30.3	22.6		
I taste food to see if it is safe or not							
Male	26.2	21.3	21.5	23.7	7.3	25.77	0.000**
Female	25.3	20.6	27.3	16.6	10.2		

* $p < 0.05$, ** $p < 0.001$

Table- III: Knowledge of food safety according to gender and safe food handling behaviors score

	Male (n:1080) $\bar{x}\pm SD$	Female(n:1064) $\bar{x}\pm SD$	t	p
Food safety knowledge score	7.69±1.63	7.67±1.67	0.001	0.999
Safe food handling behaviors score	33.55±7.72	34.34±7.68	2.366	0.018*

* p<0.05

stated that of the participants, 96% thought that it is necessary to control the inner heat to understand whether or not a chicken is cooked. Other studies show that of the consumers, 69-75% knew that cooked meals should be moved to the fridge after being cooled to room temperature.^{10,12,19} These results support the results of this study (Table-I, II).

While the present study revealed that participants consumed well done meats, many studies revealed that the meat was consumed as under-cooked.²² The reason why Turkish consumers prefer well done meat is in the nature of Turkish cuisine culture. Raw and underdone meat is not consumed in Turkish cuisine except for *cig kofte* (steak tartar ala turca). Another study stressed that cleaning is important in the case of contact with raw chicken because micro-organisms can infect the hands, clothes and counters.²³ These results support the results of this study (Table-I).

In their study Roseman and Kurzynske²⁴ stated that age, gender, income and education levels effect the food safety knowledge and safe food handling behaviors of consumers. Other studies show that females are more informed about food safety^{2,12,25} and also that adults are more informed about food safety.¹¹ Other study states that gender is not a factor in food safety knowledge and perception.¹⁸ The present study also associates the scores for food safety knowledge with age and education levels. Safe food handling behavior is statistically related to age, gender and education level. Badrie, et al.¹⁸ detected that, of the consumers, 58.0% knew that

it was necessary to keep meat, fish and chicken products in the fridge after cooling them at room temperature. 63.5% stated that they did not keep food at room temperature for more than two hours. Any food left out at room temperature for more than 2h<1h if the temperature was above 32 °C should be discarded.²⁶ The present study reached the same results conclusions (Table-II). The majority of the participants were aware of the importance of sanitation. However of the male consumers, 34.2% and of the female consumers, 36.5% stated that they always/ almost always wash their hands before eating at schools or in restaurants. In addition, many people never wash their hands before preparing food (M= % 13.7, F= % 4.4), (p<0.001). Other studies reached the same conclusion.¹⁸ The safe practice of washing hands with soap and water before the preparation of food makes food poisoning less likely to occur. Consumers do not have enough knowledge about personal hygiene, food preparation and storing practices and that many consumers do not even have basic information about detergents, disinfectants, sterilization, harmful agents or microbes. The safe practices for preventing the cross-contamination of foods were washing the cutting boards with soap and water/sanitizer.²⁶

Furthermore the present study detected that the following facts 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. Not enough care is taken with individual and environmental hygiene, particularly with the cleaning of hands.

Table-IV: Correlation between age, gender, education status and participant scores of food safety knowledge and safe food handling behaviors (r)

	Age	Gender	Education
Food safety knowledge score	0.138**	0.000	0.208**
Safe food handling behaviors score	0.426**	0.51*	0.361**

* p<0.05, ** p<0.001

Food safety training should be practical and easy to apply. The transformation of knowledge into behavior can be achieved with repetition and supervision. Training on food safety is advantageous but there are inadequacies in ensuring the transformation of that knowledge into behavior. Food mishandling is thought to be more acute among young adult men and individuals with education beyond high school than other population groups. Better educated consumers often recognize the importance of food safety and young respondents have been shown to have the greatest need for additional education about food safety.^{2,12} The attitudes of consumers towards food safety and their practices concerning food are themes of interest to food producers and retailers, public authorities and health educators. Consumer food safety education, food preparation practices and the perceived risk of foodborne illness has guided educational programs and material development. The scope of this training should encompass all sectors of society, females, males, children, young people and adults as well as the elderly. Effective public education programmes targeted at microbiological, chemical and physical food risks are essential if consumers are to change their behavior associated with poor food hygiene practice and to make a difference in the safety of foods prepared at home.¹⁸ Furthermore, governments, food producers, food industrialists and consumers must all be counted as the people responsible for providing food safety.

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