

Original Article

## Knowledge, Attitudes and Behaviors of Pregnant Women about Food Safety: A Cross Sectional Survey

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### Abstract

**Aim:** The aim of this study was to determine knowledge, attitudes and behaviors about food safety of pregnant.

**Materials and Methods:** The study was conducted on 265 pregnant in obstetrics and gynecology department of one public hospital in Izmir/ Turkey between June 2011 and June 2012. It is a cross-sectional descriptive study. In the study, a four-section- questionnaire that was created in parallel with related literature was used as data collection tool.

**Results:** Pregnant women's 75.5 % were at the age of 18-30, 36.6 % of them were literate/ primary school graduate, 83.0 % of them were housewives, and 60.0 % of them were in their 3rd trimester. Pregnant gave wrong answer to the questions how to wash hands appropriately when starting preparing food 68.3%, how to thaw frozen meat 69.4%, where to buy healthy milk 91.7%. Pregnant believe that cooked meals should be kept at room temperature until they cool (80.0%), but 78.2% of them keep them waiting, while storing or cooking foods, instructions written on their packages are important (90.6%), but 80.8% of them follow the instructions.

**Conclusions:** Pregnant women didn't receive education about food safety. Pregnant women's awareness and positive attitudes have not turned into behaviors adequately. It is vital importance that pregnant should accurately and completely be informed about food safety by health professionals.

**Key words:** Pregnancy, Food Safety, Knowledge, Attitude, Behavior.

## Background

Food safety represents a set of precautions which are taken in order to rule out physical, biological, and all kinds of dangerous agents on foods that are presented for consumption (Topuzoglu et al., 2007, Yilmaz, 2008).

Research show that every year 130 million people in Europe, 2.1-3.5 million in England, 4.7 million in Australia and 48 million in America develop a foodborne illnesses and most of these illnesses result from the mistakes made while preparing food at home (Redmond & Griffith 2003). These results emphasize the importance of consumer consciousness-raising in reducing foodborne illnesses. In America, Australia, Jamaica and various European countries, research has been done in order to determine the level of public knowledge about food safety and to overcome determined deficiencies. These research have revealed that educational background, age, gender and level of income influence consumers' level of knowledge on this subject (Redmond & Griffith 2003, Angelillo et al., 2000, Bermudez-Millan et al., 2004, Mitakakis et al., 2004, Rohr et al., 2005).

Nutrition which is one of the basic needs of all people is the bridge between food and health. In order to eat healthily, one should consume various foods evenly, abstain from foods that may be harmful to health; avoid food handling that can be harmful to health at purchasing, preparing, cooking and consuming food (Kilic, 2008).

Some of the hormonal changes emerging during pregnancy occur so as to prevent the rejection of fetus. Particularly, the rise of progesterone production provokes a decrease in immune function. Though this decrease is quite necessary for fetus to develop and survive, it, in the mean time, increases the proneness of pregnant women and fetus to infection (Morales et al., 2004).

Foodborne diseases which are known as emergencies that both unidentified pathogens and antibiotics-resistant pathogens cause have become an important issue since they potentially cause serious consequences in risk groups like pregnant women. Foodborne diseases may cause serious consequences as both woman's and fetus' lives are at risk during pregnancy (Morales et al., 2004).

Listeria, hepatitis E virus, toxoplasmosis gondii and coxiella burnetii are pathogens that can easily

go through maternal placental unit and cause serious diseases both in pregnant woman and fetus. Symptoms like nausea, vomiting, diarrhea, abortion, stillbirth, and newborn blindness that these pathogens cause can take long to emerge. The best way to prevent these symptoms is to prepare, store and keep foods hygienically (Athearn et al., 2004).

Raising new healthy generations is possible firstly through a healthy pregnancy and birth process (Deave, Johnson & Ingram 2008). During pregnancy, women are informed about topics such as sufficient and balanced diet, sleeping, exercise, avoiding smoking and use of alcohol. In addition to these, that pregnant women should also be enlightened about food safety is an issue which needs to be dwelled upon (Athearn et al., 2004).

In Turkey, there is no research examining pregnant women's knowledge, attitudes and behaviors about food safety. In this context, it has been thought that findings that will be obtained about pregnant women's knowledge, attitudes and behaviors about food safety will be a guide for planning antenatal care services and determining their content. This study was conducted to determine the knowledge, attitudes, and practices of pregnant women about food safety.

## Methodology

The study was conducted between June 2011 and June 2012 as a cross-sectional and descriptive study. Target population of the study was composed of pregnant women that applied to the clinic of obstetrics in two particular gynecology and obstetrics hospitals in Izmir/Turkey between particular dates. Healthy pregnant women who agreed to participate in the study, graduated at least primary school, had no complications were taken into the scope of the study (n=296). Since 21 of those did not fully answer the questionnaire, and 10 of them wanted to leave the study; they were not included in the study. The participation rate of the study was 89% (n=265). The study was carried out on pregnant women in clinics. Only first part of questionnaire filled by researchers by face to face interview, other parts of questionnaires filled by pregnant women for avoid bias.

## Instruments

In the study, a four-section- questionnaire form that was created according to related literature

was used as data collection tool (Kaiser & Lindsay, 2002, Kilic, 2008, Morales et al., 2004, Taylor et al, 2012, Topuzoğlu et al., 2007). Each section of questionnaire addressed important points about food safety in Turkey. The form questions included choice options for each part. First part of the questionnaire which has multiple-choice questions (13 questions) comprised introductory information about the pregnant women (age, educational background, profession, where they lived longest) and questions examining whether they received any education on food safety or not. Second part comprised questions explain the pregnant women's knowledge of food safety. In this part, there were questions which has multiple-choice options (34 questions) prepared by researchers in accordance with literature regarding potentially risky foods, cross contamination, thawing frozen meat method, dangerous temperature range on struggling with microorganisms, the way in which hands are washed before preparing food, and points to be considered while purchasing canned food.

In the third part, there were questions that have likert type scale of 1-3 (30 questions) including the pregnant women's criteria related to attitude determining behaviors while purchasing foods, food preparing and storing methods, points to be taken into account by those preparing foods, product label information, expiry date, and consumer information about foods. In the fourth part, on the other hand, there were questions which have triple likert type options (30 questions) designed to examine whether the pregnant women turned the attitudes in the third part into behaviors.

After the questionnaire form was created, the content of the form was evaluated by five relevant senior lecturers (clarity, suitable of the study aim, question order e.g.). Required changes were made. In order to evaluate the clarity of the questionnaire form, a pilot study was conducted on 30 pregnant women that were not included in the sample of the study. As a result of this study, questionnaire form was reorganized. Interviews made in waiting room without other participants before the office visit and took about 25-45 minutes.

### **Ethical Consideration**

In order for the study to be conducted, permissions were obtained from Aegean

University Faculty of Nursing Scientific Advisory Board and two particular gynecology and obstetrics hospitals in Izmir. Moreover; before the interviews, the pregnant women were informed about the aim of the study, benefits that would be provided by the study, the time they need to spend for the interviews; and their oral consents were obtained.

### **Statistics**

Data were coded by researcher to SPSS 16.0 statistics program and then counseled a biostatistics expert. When evaluating data, frequency and percentage values were calculated on SPSS 16.0 statistics program.

### **Results**

The sample size of the study was 296, participation rate of the study was 265 (recruitment rate 89%). The majority of participants were housewives (83.1%) between the ages of 18-30 (75.5%), with a primary or secondary school education (64.5%), living most of their lives in a metropolis (55.1%). It was the first pregnancy of 42.3% of the pregnant women, and 60.0% of them were in their 3rd trimester (Table 1). Approximately two thirds of pregnant (62.3%) stated that they did not receive any formal or informal education during pregnancy about food safety. More than half of those pregnant's received education any period of pregnancy stated that they were enlighten through television (57%), 16% of them through newspapers and magazines, 20% of them through school, family and friend environment, and 7% of them through health personnel.

When the pregnant women's knowledge about food safety was examined, it was observed that most of them (90%) gave correct answers about the cases in which they need to wash their hands, the fact that the foods which are sold outside in the open are not safe for health, the fact that food stuff and cleaning agents should be stored separately, the necessity of washing fruit and vegetables before consuming them, the foods that spoil quicker at room temperature. Most of the pregnant women (68.3%) gave wrong answer to the following questions how to wash hands appropriately when starting preparing food, how to thaw frozen meat (69.4%), where to buy healthy milk (91.7%), what to consider in terms of food safety when purchasing canned food (63.4%), how to check dishes for flavor (56.2%) (Table 2).

**Table 1. Distributions of Pregnant Women by Socio-demographic and Obstetric Features**

| <b>Socio-demographic features</b>          | <b>n</b>   | <b>%</b>     |
|--|------------|--------------|
| <b>Age Group</b>                           |            |              |
| 18-30                                      | 200        | 75.5         |
| 31 and older                               | 65         | 24.5         |
| <b>Educational Background</b>              |            |              |
| Literate or primary school graduate        | 97         | 36.6         |
| Secondary school graduate                  | 74         | 27.9         |
| High school and their equivalents graduate | 70         | 26.4         |
| University/Collegean graduate              | 24         | 9.1          |
| <b>Profession</b>                          | 220        | 83.1         |
| Housewife                                  | 12         | 4.5          |
| Civil Servant                              | 13         | 4.9          |
| Worker                                     | 20         | 7.5          |
| Private Sector                             |            |              |
| <b>Lived Longest in</b>                    |            |              |
| Village                                    | 53         | 20.0         |
| Town                                       | 16         | 6.0          |
| City                                       | 50         | 18.9         |
| Metropolis                                 | 146        | 55.1         |
| <b>Obstetric Features</b>                  |            |              |
| Number of pregnancies                      |            |              |
| First Pregnancy                            | 112        | 42.3         |
| Second Pregnancy                           | 98         | 37.0         |
| Third Pregnancy                            | 36         | 13.5         |
| Fourth Pregnancy                           | 19         | 7.2          |
| <b>Pregnancy Trimester</b>                 |            |              |
| 1st trimester                              | 36         | 13.6         |
| 2nd trimester                              | 70         | 26.4         |
| 3rd trimester                              | 159        | 60.0         |
| <b>Total</b>                               | <b>265</b> | <b>100.0</b> |

**Table 2. Distributions of Pregnant Women's Knowledge about Food Safety**

| Knowledge about food safety   | Knowing |      | Not knowing |      | Total |     |
|---|---------|------|-------------|------|-------|-----|
|   | N       | %    | n           | %    | n     | %   |
| In which cases do we need to wash our hands?  | 256     | 96.6 | 9           | 3.4  |       |     |
| How do we wash our hands duly and most appropriately when we start preparing food?  | 84      | 31.7 | 181         | 68.3 |       |     |
| What kind of disease does not washing hands after going to toilet cause?  | 143     | 54.0 | 122         | 46.0 |       |     |
| Are foods sold outside safe for health?   | 248     | 93.6 | 17          | 6.4  |       |     |
| Can food stuff and cleaning agents be stored in the same place in terms of food safety?                                       | 241     | 90.9 | 24          | 9.1  |       |     |
| Is washing fruit and vegetables before consuming important in terms of food safety?   | 251     | 94.7 | 14          | 5.3  |       |     |
| In what ways do organisms contaminate food?   | 166     | 62.6 | 99          | 37.4 |       |     |
| Can frozen food stuff be refrozen after being thawed?   | 226     | 85.3 | 39          | 14.7 | 265   | 100 |
| In what following ways should frozen meat be thawed?  | 81      | 30.6 | 184         | 69.4 |       |     |
| Where is healthy milk bought most appropriately?  | 22      | 8.3  | 243         | 91.7 |       |     |
| Which is not important in terms of food safety when purchasing canned food?   | 97      | 36.6 | 168         | 63.4 |       |     |
| Which of the following foods spoil quicker at room temperature?   | 243     | 91.7 | 22          | 8.3  |       |     |
| How are dishes checked for flavor?  | 116     | 43.8 | 149         | 56.2 |       |     |
| Why are additives used in safe food stuff?  | 184     | 69.4 | 81          | 30.6 |       |     |
| It is unfavorable to consume raw egg, all kinds of raw meat (chicken, fish, red meat) and raw food (steak tartar a la turca). | 210     | 79.2 | 55          | 20.8 |       |     |

**Table 3. Distributions of Pregnant Women's Attitudes about Food Safety**

| Attitudes towards food safety   | I agree |      | I partially agree |      | I do not agree |      |
|---|---------|------|-------------------|------|----------------|------|
|   | n       | %    | n                 | %    | n              | %    |
| Milk should be kept on the fridge door.   | 204     | 77   | 50                | 18.9 | 11             | 4.1  |
| Branded products are always high in quality.  | 95      | 35.8 | 117               | 44.2 | 53             | 20.0 |
| Conditions of places where food stuff is sold are important.                                    | 245     | 92.4 | 15                | 5.7  | 5              | 1.9  |
| Nutritious features of food stuff are more important than its flavor.                           | 20      | 79.2 | 46                | 17.4 | 9              | 3.4  |
| Food stuff sold in big stores or shopping centers are of good quality.                          | 88      | 33.2 | 126               | 47.5 | 51             | 19.3 |
| Free gifts that are offered with food stuff are effective on purchasing process.                | 106     | 40.0 | 95                | 35.8 | 64             | 24.2 |
| Foods that cause food poisoning have look, taste and smell bad.                                 | 197     | 74.3 | 45                | 17.0 | 23             | 8.7  |
| Cooked foods should be kept at room temperature until they cool.                                | 212     | 80.0 | 36                | 13.6 | 17             | 6.4  |
| There is no harm in using cracked or fractured eggs.  | 48      | 18.1 | 37                | 14.0 | 180            | 67.9 |
| Overcooked eggs can be kept at room temperature for more than two days.                         | 27      | 10.2 | 31                | 11.7 | 207            | 78.1 |
| Cooked foods must not be touched after touching raw food.                                       | 150     | 56.6 | 69                | 26.0 | 46             | 17.4 |
| Cooked foods and raw foods should be kept separately.   | 213     | 80.4 | 36                | 13.6 | 16             | 6.0  |
| Food freezing process does not kill bacteria, it just stops them reproducing.                   | 159     | 60.0 | 77                | 29.1 | 29             | 10.9 |
| Canned foods can be stored on shelves in their original packages.                               | 199     | 75.1 | 41                | 15.5 | 25             | 9.4  |
| Foods stored incorrectly do not create danger for our health.                                   | 51      | 19.2 | 24                | 9.1  | 190            | 71.7 |
| While breathing out smoke, salivary contaminates into foods.                                    | 171     | 64.5 | 62                | 23.4 | 32             | 12.1 |
| Food expiration date is always important.   | 245     | 92.4 | 15                | 5.7  | 5              | 1.9  |
| Big restaurants and cafes are always hygienic.  | 41      | 15.5 | 127               | 47.9 | 97             | 36.6 |
| It is important for stores that produce and sell food products to have a safe food certificate. | 233     | 87.9 | 26                | 9.8  | 6              | 2.3  |
| If any food bought is rotten, it should be returned.  | 243     | 91.7 | 17                | 6.4  | 5              | 1.9  |
| Hormone-free foods are good for health.   | 232     | 87.5 | 20                | 7.6  | 13             | 4.9  |
| Expired foods should be thrown away without being consumed.                                     | 246     | 92.8 | 12                | 4.5  | 7              | 2.7  |
| Meat and fish are stored separately.  | 201     | 75.8 | 40                | 15.1 | 24             | 9.1  |
| Label information on foods should be checked before consuming them.                             | 246     | 92.8 | 17                | 6.4  | 2              | 0.8  |
| While storing or cooking foods, instructions written on their packages are important.           | 240     | 90.6 | 25                | 9.4  | 0              | 0.0  |
| Food groups should be stored separately.  | 217     | 81.9 | 40                | 15.1 | 8              | 3.0  |
| Consuming expired foods is the reason for food poisoning.                                       | 200     | 75.5 | 48                | 18.1 | 17             | 6.4  |
| Thawed meat should not be refrozen.   | 204     | 77.0 | 28                | 10.5 | 33             | 12.5 |
| One should wear apron, bonnet and gloves when preparing food.                                   | 182     | 68.7 | 69                | 26.0 | 14             | 5.3  |

**Table 4. Distributions of Pregnant Women's Behaviors about Food Safety**

|   | Yes |      | No |      | Sometimes |      |
|---|-----|------|----|------|-----------|------|
|   | n   | %    | n  | %    | n         | %    |
| I keep milk on the fridge door.   | 213 | 80.4 | 20 | 7.5  | 32        | 12.1 |
| Since branded products are always high in quality, I prefer them.   | 123 | 46.4 | 44 | 16.6 | 98        | 37.0 |
| Since conditions of places where food stuff is sold are important, I pay attention to this.                     | 234 | 88.3 | 7  | 2.6  | 24        | 9.1  |
| Nutritious features of food stuff are more important than its flavor.   | 218 | 82.3 | 11 | 4.2  | 36        | 13.5 |
| I trust the quality of Food stuff sold in big stores or shopping centers.                                       | 101 | 38.1 | 40 | 15.1 | 124       | 46.8 |
| Free gifts offered with food stuff are effective on my purchasing and decision making process.                  | 101 | 38.1 | 66 | 24.9 | 98        | 37.0 |
| I do not consume foods that look, taste and smell bad because they cause food poisoning.                        | 234 | 88.3 | 14 | 5.3  | 17        | 6.4  |
| I keep cooked foods at room temperature until they cool.  | 208 | 78.5 | 19 | 7.2  | 38        | 14.3 |
| I do not use cracked or fractured eggs since they are harmful for health.                                       | 207 | 78.2 | 20 | 7.5  | 38        | 14.3 |
| I consume overcooked eggs without keeping it waiting at room temperature.                                       | 210 | 79.2 | 25 | 9.5  | 30        | 11.3 |
| After touching raw food, I wash my hands before touching cooked foods.  | 222 | 83.8 | 16 | 6.0  | 27        | 10.2 |
| I keep cooked foods and raw foods separately.   | 203 | 76.6 | 31 | 11.7 | 31        | 11.7 |
| Since food freezing process does not kill bacteria but just stops them reproducing, I make sure remain frozen . | 194 | 73.2 | 20 | 7.5  | 51        | 19.3 |
| I keep canned foods in their original package on shelves.   | 221 | 83.4 | 13 | 4.9  | 31        | 11.7 |
| I pay attention to storage heat while storing foods.  | 220 | 83.0 | 18 | 6.8  | 27        | 10.2 |
| I do not allow people to smoke while preparing foods.   | 174 | 65.7 | 35 | 13.2 | 56        | 21.1 |
| I always pay attention to expiry date of foods since it is important.   | 249 | 94.0 | 8  | 3.0  | 8         | 3.0  |
| I find it more important for a store that produces food to be hygienic than to be high capacity.                | 241 | 90.9 | 2  | 0.8  | 22        | 8.3  |
| While shopping at stores that produce and sell food products, I prefer the ones with safe food certificate.     | 205 | 77.4 | 12 | 4.5  | 48        | 18.1 |
| I return any food I bought if it is rotten.   | 234 | 88.3 | 2  | 0.8  | 29        | 10.9 |
| Since hormone-free foods are good for health, I try to consume them.  | 227 | 85.7 | 12 | 4.5  | 26        | 9.8  |
| I throw expired foods away without consuming them.  | 248 | 93.6 | 9  | 3.4  | 8         | 3.0  |
| I keep meat and fish separately.  | 195 | 73.6 | 36 | 13.6 | 34        | 12.8 |
| I purchase food stuff by checking their label information.  | 227 | 85.7 | 4  | 1.5  | 34        | 12.8 |
| I follow the directions on the package of products while keeping and cooking them.                              | 214 | 80.8 | 6  | 2.2  | 45        | 17.0 |
| I keep food groups separately.  | 208 | 78.5 | 21 | 7.9  | 36        | 13.6 |
| I do not consume expired foods since they cause food poisoning.   | 252 | 95.1 | 5  | 1.9  | 8         | 3.0  |

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|   |     |      |    |      |    |      |
|---|-----|------|----|------|----|------|
| I do not refreeze the meat that I have thawed since it is not safe. | 228 | 86.0 | 11 | 4.2  | 26 | 9.8  |
| I wear apron, bonnet and gloves when preparing food in kitchen.     | 132 | 49.8 | 41 | 15.5 | 92 | 34.7 |

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When the pregnant women's attitudes about food safety were analyzed, most of them stated that they agreed on items: conditions of places where food stuff is sold are important (92.4%), expiry dates are important, (92.4 %), expired foods should be thrown away(92.8%), label information should be checked before using (92.8 %), instructions on the package are important when storing or cooking products (90.6 %), cooked foods should be kept at room temperature until they cool (80%), raw foods and cooked foods should be stored separately (80.0%), thawed meat should not be refrozen (77.0%) (Table 3).

When the pregnant women's behaviors about food safety or unsafety were analyzed; while 80.0 % of them thought that they should keep cooked foods at room temperature until they cool, 78.2% of them stated that they keep waiting, and 90.6% of them stated that while storing or cooking foods, instructions on the package are important, yet 80.8% of them stated that they follow the instructions. 87.9% of the pregnant women pointed out that it is important for stores that produce and sell food products to have a safe food certificate, but 77.4% of them stated that they prefer these stores (Table 4).

## Discussion

In the study, when the pregnant women's knowledge about food safety was analyzed, it was determined that more than half of the pregnant women (62.3%) did not receive any education about food safety, more than half of those who received education got this information through television. In their study Bal et al. stated that 48.4% of the consumers do not know what food safety means and have never heard of this term, 51.6% of them, on the other hand, have heard this term before. 79.7% of those who have heard the term defined food safety concept correctly; yet it was found out that 20.3 % of them heard this term; however, they did not know what it means or they had wrong information about it (Bal et al., 2006). In his study, it was determined that half of the participants (49.6%) did not have adequate knowledge about food safety. However, 88.6 % of them stated that they are interested in food safety. It was observed that those who would like to get information about this subject, mostly took advantage of television, radio (74%) and newspaper and magazines (60%) (Yilmaz, 2008). In the questionnaire study conducted by Unusan (2007) in Konya on 458 participants, it was determined that they have knowledge deficiencies

about food safety and purchasing Cates et al.,(2004), found out that despite the participants believed they prepare food safely at home, they had a little knowledge about food safety and safe hygiene practices. As it can be understood from the studies, the level of knowledge about food safety in our society is low; and it is clear that this lack of knowledge should be addressed. Particularly during pregnancy, food borne diseases can cause serious consequences since both woman and fetus' health are at risk (Morales et al., 2004). Thus, food safety becomes more important for pregnant women.

Taylor et al., (2012) stated that health personnel have an important informative role during women's pregnancy and participants regard health personnel as a reliable and substantial source. It was suggested that informing pregnant women about food safety with the same resources and personnel developed is important in that this will provide consistency in messages and raise awareness. Morales et al.(2004) stated in his study which was conducted on 23 health personnel that only 8 of them enlighten pregnant women about food safety. As it is also understood from research, it can be said that health staff do not pay enough attention to this subject, they do not inform pregnant women, and so pregnant women try to close this gap by mass media such as television. Similarly, in our study it was concluded that more than half of those who were informed about this subject got this information through television; and obtained data correspond well to literature data.

A great majority of participants agreed that foods sold outside are not safe for health. It is demanded that food packages preserve food most properly and measure up to prevent deterioration because foods deteriorate easily because of microbiological, biochemical, physical effects and effect of moisture, and they lose their aroma. It is of vital importance that purchased foods are checked by buyers in order both to ensure consumers' health and avoid being economically cheated. Foods with packages that are crushed, torn or deformed for any reason should not be purchased. Foods with inadequate packaging always have a risk of contamination ([http://www.yyu.edu.tr/abis/admin/dosya/1299/dosyalar/1299\\_17022014124750\\_71189.pdf](http://www.yyu.edu.tr/abis/admin/dosya/1299/dosyalar/1299_17022014124750_71189.pdf)). In our study it can be said that the pregnant women have a high level of awareness on this issue but it is not sufficient. However, this awareness should be conveyed to pregnant women by health personnel

that offer antenatal care, and it should be emphasized meticulously.

In our study, more than half (60%-91%) of the pregnant women gave wrong answers to the questions: how to wash hands appropriately when starting preparing food, how to thaw frozen meat, where to buy healthy milk, what to consider in terms of food safety when purchasing canned food, how to check dishes for flavor. WHO identified contaminated raw foods, insufficient cooking/heating processes, poor hygiene practices and infected persons touching foods as most common mistakes (WHO, 1999). Data that we obtained show parallelism with WHO data. Educations about food safety that will be provided for pregnant women by health personnel are important in terms of preventing wrong applications and the mistakes made on this issue.

In our study, a great majority of the pregnant women stated that conditions of places where food stuff is sold are important, date of expiry is important, and label information on foods should be checked before consuming them. Reading labels on food is defined as the most important behavior that a consumer can exhibit about conscious purchasing and health diet (Topuzoglu, 2007). In their study that was conducted on a total of 185 consumers consisting of 98 women and 87 men aging between 19-59 years and going shopping, Sanlier and Seren (2005) determined that about purchasing 8.1% of the consumers have low level of awareness, 37.8% of them have high level of awareness, and 54.1 % of them have medium level of awareness. Kizilaslan & Kizilaslan (2008) identified consumers' considering the nutritional value, their reading label information and their paying attention to use of harmless packaging as their first and most important knowledge and attitudes. In the study of Ozgul and Aksulu, it was found out that in 2005, production and expiry dates maintained its being more important than any other label information when compared to 1995 (Ozgul & Aksulu 2006). In his study, Yilmaz (2008) stated that 54.8 of the consumers in urban areas pointed out that they read and review label information, 30.9% of them certainly review and 4.9 of them do not have an idea about this. Families in urban areas state that they pay most attention to production and expiry date when purchasing convenience foods. Our study bears a resemblance to other studies. When reviewing literature, it can be said that individuals have

become more conscious consumers and given more importance to this subject.

While preparing foods, they undergo lots of various processes such as cutting, chopping, slicing, stirring, dressing and portioning. Each food should be prepared within its own group in the same unit. For instance, meat, vegetables and dough should not be prepared on the same counter. Raw foods and cooked foods should be treated separately. Foods that are made ready to cook, particularly foods including meat and eggs, should not be kept waiting at kitchen temperature and cooked immediately; or they should be put into chillers (Dikmen, 2013). In our study most of the pregnant women (80%) stated that they agree that cooked foods should be kept at room temperature until they cool, raw foods and cooked foods should be stored separately (80%), thawed meat should not be refrozen (77%). In literature, in the study conducted on 22386 cases about the food group causing foodborne illnesses, it was determined that 40.0 % of these cases happened because of eggs or foods that contain eggs. Of these cases 15.0 % them were due to meat and meat products, 8.0 % of them were due to milk and milk products, 5.0 of them were due to fish and shellfish, 4.0 % of them were due to mushroom and 3.0% of them were due to chicken (WHO,2002). Kaiser and Lindsay (2002), emphasized that pregnant women should not consume unpasteurized juices, raw sprouts, and unpasteurized milk products. In addition, it has been stated that they should avoid consuming raw or rare cooked meat, chicken, eggs, fish, and shellfish. Particularly *Listeria* can be found in meat and other raw foods or processed chilled foods. *Listeria* is killed by pasteurization and cooking. This kind of infections in pregnant women may result in abortions, stillbirths or newborn diseases (Taylor, Bitzikos & Galanis 2008). In studies carried out, it was determined that pregnant women continued consuming raw and poorly-processed food during their pregnancy, and only a few of them did not consume these foods for food safety during their pregnancy (Athearn et al., 2004,Cates et al., 2004, Jevsnik, Hoyer & Raspor, 2008).

In our study, almost all pregnant women (96.6%) gave the correct answer to the question "In which cases do we need to wash our hands?". In studies carried out it was determined that participants generally believe that they should wash their hands in order to get rid of microorganisms before preparing foods (Unusan, 2007, Worsfold &

Griffith 1997, Jevsnik, Hoyer & Raspor, 2008). Data obtained through our study is quite high. It can be said that it is because the sample group was composed of women population and women are more careful about food safety during pregnancy. In our study, a great majority of the pregnant women stated that they agree that conditions of places where food stuff is sold are important (92.5%), date of expiry is important (92.5%), and label information on foods should be checked before consuming them, while storing or cooking foods, instructions written on their packages are important (90.6%). Jevsnik et al.(2008), pointed out that pregnant women are more careful about deformed packages and expiry dates while purchasing food compared to those who are not pregnant. That study has parallels with our study and it is possible to say that women are more careful about food safety during pregnancy. However, in literature within studies conducted on women that were not pregnant, it was reported that they had a low level of tendency to get information and insufficient attitudes which require nutritional information (Topuzoglu et al., 2007, Deave ,Johnson & Ingram, 2008). It is surprising that attitudes about checking expiry date which preserves the consumer at the very beginning are at insufficient levels in studies.

Taylor et al.(2012) stated that participants had a high level of knowledge about general food safety and some high-risk foods. Participants pointed out that food safety is important for them; however, it was determined that their knowledge and practices did not reflect that. For this reason, participants stated that they consumed high-risk foods during pregnancy. Besides questionnaire studies on food safety, Bermudez-Millan et al. (2004) conducted observation-based studies and found out that people do not follow many safety rules while cooking. Mitakakis et al., (2004) found out that while preparing food, all participants made mistakes that might cause contaminations.

Besides, it was observed that 70.3 % of the participants did not appropriately clean the surfaces that are used while preparing foods, 46.6 % of them did not wash their hands at necessary frequency, 81. 2% of them did not appropriately store foods in fridge, 76.3% of them preferred unsafe methods while thawing frozen meat. In our study, on the other hand, when analyzing the question whether the pregnant women turned their attitudes about food safety into behaviors, it was determined that 80% of them believe that cooked

meals should be kept at room temperature until they cool, but 78.2% of them keep them waiting, 90.6% of them believe that while storing or cooking foods, instructions written on their packages are important, but 80.8 % of them follow the instructions. 87.9 of the pregnant women stated that it is important for stores that produce and sell food products to have a safe food certificate, but 77.4 % of them stated that they prefer those stores.

### Conclusions

It was concluded that more than half of the pregnant women did not receive education about food safety, that those who got education received it through mass media such as television and the reliability of this information should be discussed, that there is awareness about food safety, that attitudes about food safety are generally positive, but that this awareness and positive attitudes have not turned into behaviors adequately. Moreover, the question why their awareness and positive attitudes did not turn into behaviors is another point to be analyzed.

According to various research carried out in our country, the level of education offered in antenatal follow-ups is not satisfactory in term of quality and quantity. It has been thought that it is important to inform primarily health professionals about food safety within in service training programs, and then make them give pregnant women adequate and accurate information. Besides informing pregnant women about food safety, during antenatal follow-ups health professionals should also inform them about the ways in which they can use the Internet to reach reliable and accurate sources of information; and establish a platform which is necessary to correct inaccurate information.

This research has some limitations that concerns the sampling frame used. Since this study used convenience sampling, it can't represent an entire population. So, it is hard to generalize to all Turkish people. Similarly, various further analyses could have been done on the outbreak diverse demographic groups data such as age, income level, the number of pregnancies, gestational age, educational status. Thus, future study should be test these limitations.

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