The knowledge and practice of food safety by young and adult consumers

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1. Introduction

Each year, millions of people worldwide suffer from food-borne diseases and illnesses resulting from the consumption of contaminated food, which has become one of the most widespread public health problems in the contemporary world (Notermans, Gallhof, Zweitering, & Mead, 1995; WHO, 2000).

In less developed countries, many people are poisoned because of the consumption of foods produced under unhygienic conditions; lack of hygiene education; drought; contaminated waters; inappropriate food storage conditions; lack of cleaning; and pesticide residue. However, food poisoning is not a phenomenon specific only for less developed countries. The presentation of food is significant in many countries (Sockett, 1995). The most common factors contributing to food-borne disease outbreaks include safe keeping of food (time/temperature), contaminated equipment, food from unsafe sources, poor personal hygiene, and inadequate cooking (Lynch, Painter, Woodruff, & Braden, 2006; WHO, 1989).

Earlier studies conducted on adults have indicated that food safety knowledge tends to increase with age and practice: females have higher scores than males, and younger respondents show the greatest need for additional food safety education (Bruhn & Schutz, 1999; Byrd-Bredbenner et al., 2007; Rimal, Fletcher, McWatters, Misra, & Deodhar, 2001; Unusan, 2007). Williams et al. (1992) suggested that children and adults are usually unaware of basic methods of food handling and preparation, although a substantial proportion of food-borne illnesses can be attributed to improper preparation according to Redmond and Griffith (2003). The need for enhanced food safety education started to be recognized in developed countries with the launch of national initiatives to find ways to educate consumers effectively, especially youngsters and adults who prepare food (Haapala & Probart, 2004). Although this is such an important issue, there is no education program or legal responsibility in Turkey to enhance food safety knowledge and practices of consumers in any age group, or to ensure that this knowledge becomes part of their everyday practice.

This study was conducted in Ankara, the capital city of Turkey, so as to determine the food safety knowledge and practices of the
young and adults. Learning about basic knowledge, practices and behavior of young and adult consumers is essential for the development of effective health education programs in Turkey.

2. Material and methods

2.1. Research design

A cross-sectional study was conducted from April to December 2006 on food safety knowledge, practice and behavior of young and adult consumers in the districts of Ankara, the capital city of Turkey. The research sampling was formed from 815 young and 646 adult (totaling 1461) voluntary consumers. Participants in the 14–19 years age range were classified as “young” and the participants in the 20 years and above age range as “adult” consumers. Initially, the aim was to survey 1500 consumers. However, 39 consumers who initially agreed to participate left the study during the survey process. Twenty years ago, there was a traditional family life in Turkey, therefore meal preparation and cook were women task, but nowadays the number of working women was increasing. Both men and women share household duties. Cook and preparation meal is not a task primarily practiced by one gender.

2.2. Instrumentation

The research data was collected through a questionnaire and face-to-face interviews. The 21 item written questionnaire was a modified from other researchers (Buyruk & Sahin, 2002; Duffy, 1998; Sammarco, Ripabell, & Grasso, 1997; Unusan, 2007). The questionnaire was pilot tested by 150 participants from April to June 2006, resulting in minor modifications made to the wording of questions. The revised questionnaire was divided into three sections:

1. A demographic section.
2. Food safety knowledge (10 questions).
3. Food safety practices (11 questions).

Answers were graded by giving a point for the right answers and 0 point for the wrong answers given to the questions related with food safety knowledge. The scale (which were related with safe food preparation practices) included a set of negative sentences (see Table 1, statements 1, 6, 7 and 10) in addition to the positive ones. Responses to the positive sentences had been graded as follows: “almost never”, 1 point; “sometimes”, 2 points; “often”, 3 points; and “always”, 4 points. In the negative sentences, the grades had been assigned in a reverse order. Scores regarding food safety knowledge vary from 0 to 10 and the scores related with safe food preparation practices vary from 11 to 44.

Cronbach alpha coefficient of internal consistency was used to estimate the reliability of the questionnaire. Alpha coefficient of 0.76 was considered to be acceptable for food safety knowledge.

Each questionnaire took ~20 min. to administer. Data was collected on weekends and weekdays from consumers.

2.3. Data Collection

The study data was collected by 16 interviewers, each of whom distributed 94 questionnaires. Interviewers were trained, postgraduates students, who visited selected households or interviewed adult consumers in larger shopping centers and with young in high schools in Ankara, Turkey. The objective of the study was briefly explained to young and adult consumers by interviewers. To guarantee anonymity of responses and easy identification of questionnaires by individuals, identity numbers were randomly assigned to each questionnaire. Items in the questionnaire were explained when necessary and administered at one sitting as far as possible.

2.4. Data analysis

The findings were analyzed with respect to youth and adults. The data was analyzed with SPSS software (Statistical Package for the Social Sciences, version 11.0, SPSS Inc., Chicago, IL, USA). Mean responses and percentages of responses in each category were calculated and presented in a tabular form.

Mean and standard deviation values were used to evaluate the scores. In addition, in terms of the correlation between age and the scores of food safety knowledge and safe food preparation, Pearson chi square and t-test results were used in the evaluation of the questions related with food handling practices. Statistical significance was set at a P value of <0.05 (Acikel & Kilic, 2004).

3. Results

3.1. Profile of respondents

One thousand four hundred sixty-one questionnaire forms were filled in by young and adult consumers. Of the adult respondents 56.2% were female and 43.8% were male while 46.6% of young consumers were female and 56.2% male. The majority of the young respondents were between 14 and 19 years of age and adult respondents were from 20 to 66 years of age.
of 90.4% of young consumers were housewives, the fathers of 48.5% of these young consumers had their own work places. Nearly half of the adult consumers were housewives (44.6%) and middle and high school (secondary school) graduates (37.0%).

3.2. Food safety knowledge levels of young and adult consumers

Table 1 presents the right answers given by young and adult consumers to the questions about food safety knowledge.

Young consumers (88.1%) prefer to taste milk while adult consumers (82.8%) prefer to look at its expiry date to control if it is safe or not. Most of young consumers (87.0%) and nearly all of the adult consumers (93.7%) state that tins with lids which are bloated and tight are unfavorable. Seventy-four percent of young consumers state that the internal temperature of a chicken must be high for safe cooking and 76.5% of the adults state that pasteurized milk can be stored in the refrigerator for a maximum of 3 days in its unopened box. 88.1% of adult consumers gave the right answer to the question about how to clean cutting-boards. However, the rate of young consumers who know true that raw chicken, fish and meat should not have contact with each other (78.9%) and that solely cold water is not enough to clean hands (50.9%) is lower when compared with the rate of adult consumers having such knowledge. A significant relationship has been revealed between the answers given to such questions and age, education status ($P < 0.05$).

3.3. Safe food preparation behaviors and practices of the young and the adult

Safe food preparation practices of young and adult consumers are presented in Table 2.

74.3% of young consumers and 82.0% of adult consumers state that they always wash their hands before preparing and eating food at home. Additionally, most of them (40.5% and 56.2%, respectively) express that they wash their hands before eating in school canteens or at restaurant. While 38.4% of young and 36.1% of adult consumers use paper towel to dry their hands, most of both groups (75.8% and 71.9%, respectively) clean their hands before preparing food comprised of raw meat or ready meat products.

It was determined that 76.6% of young people always clean the surfaces with cleaners which consist chlorine after every use and before preparing food, and that half of them (55.1%) put the remaining food in the refrigerator within two hours, and 65.2% of them read the expiry date written on the package, and that nearly half of them (46.6%) taste food to ascertain if it is safe or not. These ratios are, respectively 72.5%, 55.8%, 62.2% and 58.1% for adults. Moreover, 61.1% of young consumers eat meat after cooking it well, 37.5% do not eat raw eggs or raw egg-added food, and 67.9% put the easy-to-spoil food into the refrigerator within two hours. These ratios are, respectively 86.8%, 57.6% and 77.1% for adults. The relationship in terms of practice between young and adult consumers has been found to be statistically meaningful ($P < 0.001$).

### Table 2

<table>
<thead>
<tr>
<th>Safe food preparation practices of youth and adults</th>
<th>Almost never (%)</th>
<th>Sometimes (%)</th>
<th>Often (%)</th>
<th>Always (%)</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I wash my hands before preparing and eating food at home</td>
<td>Youth 1.2</td>
<td>8.3</td>
<td>16.2</td>
<td>74.3</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 0.6</td>
<td>5.6</td>
<td>11.8</td>
<td>82.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wash my hands before eating food in the school canteen/restaurant</td>
<td>Youth 12.2</td>
<td>34.0</td>
<td>14.2</td>
<td>40.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 7.4</td>
<td>12.5</td>
<td>23.9</td>
<td>56.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I dry my hands with a paper towel</td>
<td>Youth 9.9</td>
<td>38.4</td>
<td>16.8</td>
<td>34.9</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 16.6</td>
<td>36.1</td>
<td>22.6</td>
<td>24.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wash my hands before preparing food comprising raw meat and ready meat products</td>
<td>Youth 2.3</td>
<td>7.2</td>
<td>14.7</td>
<td>75.8</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 3.9</td>
<td>9.9</td>
<td>14.3</td>
<td>71.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I clean the surfaces with cleaners which consist chlorine after every use and before preparing food</td>
<td>Youth 1.0</td>
<td>6.1</td>
<td>16.3</td>
<td>76.6</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 3.1</td>
<td>8.8</td>
<td>15.6</td>
<td>72.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I put the remaining food into the refrigerator within 2 h</td>
<td>Youth 12.0</td>
<td>17.9</td>
<td>15.0</td>
<td>55.1</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 6.2</td>
<td>22.3</td>
<td>15.6</td>
<td>55.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I check the expiry date written on the food packages</td>
<td>Youth 3.7</td>
<td>17.7</td>
<td>13.4</td>
<td>65.2</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 5.6</td>
<td>9.4</td>
<td>22.8</td>
<td>62.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I taste food to see if it is safe or not</td>
<td>Youth 22.9</td>
<td>19.8</td>
<td>10.7</td>
<td>46.6</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 14.2</td>
<td>9.6</td>
<td>18.1</td>
<td>58.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I eat meat after cooked well, I do not consume rare meat</td>
<td>Youth 17.7</td>
<td>13.1</td>
<td>8.1</td>
<td>61.1</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 2.5</td>
<td>5.0</td>
<td>5.7</td>
<td>86.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not eat raw eggs or foods made from raw eggs</td>
<td>Youth 43.1</td>
<td>13.1</td>
<td>6.3</td>
<td>37.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 17.0</td>
<td>9.3</td>
<td>16.1</td>
<td>57.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I put the easy-to-spoil foods into the refrigerator as soon as I buy them</td>
<td>Youth 9.1</td>
<td>10.7</td>
<td>12.4</td>
<td>67.9</td>
<td>0.000*</td>
</tr>
<tr>
<td>Adult 2.5</td>
<td>3.7</td>
<td>16.4</td>
<td>77.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $P < 0.05$, youth = 815; adult = 646, total = 1461.
Food safety knowledge scores and safe food preparation practice scores of young and adult consumers

<table>
<thead>
<tr>
<th></th>
<th>Youth</th>
<th>Adult</th>
<th>t</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food safety knowledge score</td>
<td>5.81 ± 1.43</td>
<td>8.01 ± 1.86</td>
<td>25.407</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Safe food preparation practice score</td>
<td>28.85 ± 7.06</td>
<td>30.47 ± 6.14</td>
<td>4.594</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

### 3.4. Food safety knowledge scores and food preparation practice scores of youth and adults

The average of the food safety knowledge scores of young consumers was calculated as 5.81 ± 1.43 while it was 8.01 ± 1.86 for adult consumers and, safe food preparation scores of the young was found to be 28.85 ± 7.06 while it was 30.47 ± 6.14 for adults.

Knowledge scores and food handling scores of adult consumers are higher than the scores of young consumers and the relationship between them is significant (P < 0.001) (Table 3). A correlation was determined between age and the scores of food safety knowledge and practice; and between food safety knowledge scores and safe food preparation practice scores (P < 0.001) (Table 4). A simply say that the knowledge and food handling scores of the adult consumers were significantly higher (P < 0.001) than comparable scores of the young consumers.

### 4. Discussion

Although the public is increasingly concerned about food-related risks, the rise in food poisoning cases suggests that people still make decisions of food consumption, food storage and food preparation that are less ideal from a health and safety perspective (McCarthy et al., 2007). The percentage of cases arising from food preparation practices in the home may be especially under-represented in outbreak statistics, due to many factors (Day, 2001). Studies have estimated that between 50 and 87% of reported food-borne disease outbreaks have been associated with the home (Redmond & Griffith, 2002). Common mistakes identified comprise serving contaminated raw food, raw food of animal origin, and the practice of poor hygiene (WHO, 1999).

Although it is of great importance for consumers to distinguish safe food and to develop food safety knowledge, behaviors and practices; there are only a few studies conducted on food safety knowledge and the perceptions of consumers in Turkey. In fact, many studies have revealed that old or very young consumers and consumers of low educational backgrounds and income levels are exposed to much more risks when compared with young consumers (Baker, 2003; Dosman, Adomowicz, & Hrudey, 2001; Goktolga, Bal, & Karkaci, 2006). In another study, significant differences were found in food safety perceptions for age, gender, household income, education and employment in the food industry. In addition, a significant relationship has been determined between the perception of safe food by consumers and their behavior (Roseman & Kurzynske, 2008). Food mishandling is thought to be more acute for young adult men and individuals with an educational level beyond high school than other groups (Altekruse, Yang, Timbo, & Angulo, 1999). Cakiroglu and Uçar (2007) found that food hygiene perception scores are higher in women than men, as well as in the above-45 group than in other age groups and in university graduates. In many societies women are more informed about appropriate methods of food handling and storage than men. Better educated consumers often recognize the importance of food safety and younger respondents have shown the greatest need for additional education on food safety (Bruhn & Schutz, 1999; Li-Cohen & Bruhn, 2002; Sudershan et al., 2007).

The results of such studies support the results obtained in this study. Food safety knowledge scores and practice scores of young consumers are found to be lower than those of adult consumers. Sammarco et al. (1997) stated that 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 micros. This study revealed that consumers do not have enough knowledge about buying, preparing, cooking and storing milk, canned foods, meat, chicken, etc., that they do not know about bacteria and do not give care to personal hygiene and the hygiene of their environment while preparing food. Particularly, lack of information and perception is encountered among young consumers more than among adult consumers (P < 0.001). The fact that both groups are not equipped with safe food preparation behaviors and practices and that they have low scores underline, once again, the necessity to provide education on food safety.

Low personal perception of the risks related to food safety issues would imply that consumers ignore the potential risk from microbiological hazards and apply improper measures during home food preparation and storage practices, improper thawing of food, or cross contamination, or inadequate storing and reheating of cooked foods. Moreover, an essential knowledge of food pathogens microbiology may motivate consumers to use safe food storage, preparation and cooking procedures (Altekruse, Street, Fein, & Levy, 1996).

The results obtained in this study have revealed the need to develop a state policy regarding education to be given to consumers in Turkey. Written educational pieces provide a good opportunity to focus on all food safety practices because they provide educators with more space to explain the growth of microorganisms and their link to inappropriate practices. With the current low perceived susceptibility, consumers are unlikely to adopt safer practices in their food handling (Merdol et al., 2003; Unusan, 2007). Several studies have identified the need for continued consumer education about the hazards of improper food handling (Finch & Daniel, 2005; Karabudak, Bas, & Kiziltan, 2008; WHO, 2000). Food safety education should be given not only to consumers but also to managers and staff working in food-beverage processing businesses so as to bring behavioral changes and to ensure the adoption of positive attitudes (Cohen & Roberts, 2005; Powell, Attwell, & Massey, 1997). Studies show that the food safety knowledge of managers and staff working in small and developing catering businesses is at an insufficient level (Bolton, Meally, Blair, McDowell, & Cowan, 2008; Walker & Jones, 2002).

An efficient and continuous food safety education will enable consumers (children, youth, adults and the elderly) to learn the methods for preventing health threatening food safety problems and change their misguided habits. Programs should feature the following topics including practical information on microbiology of food-borne diseases, personal hygiene, suitable cleaning procedures, proper home food preparation, and prevention of cross-contamination and food storage practices (Sammarco et al., 1997).

As a conclusion, it should be ensured that the messages planned to be conveyed with regard to food safety education programs to be given to consumers at any age group will be long lasting; the
education should be repeated with specific intervals to ensure that learnt information is turned into attitudes and behaviors; and procedures and processes should be controlled regularly. Such education should be started during childhood and should reach the masses of people through formal and informal education and mass media.

5. Limitation of the study

Because the population of this study consisted of consumers in central Ankara, the results should not be generalized to all youth, adults, all ages or to the entire country. Although the reliability coefficient was found to be high, this research measured self-reported behaviors, which are prone to bias by the subjects.

Acknowledgement

I would like to thank the postgraduates who have made useful contributions and have exerted their efforts in the collection of the study data, and to the young and adult consumers who have answered the questions honestly.

References


