Abstract

Consumer awareness and acceptance, and influence of benefit statements and price on acceptance of irradiated foods were investigated in Turkey. Consumer awareness of food irradiation was very low (29%). Majority of consumers (80%) were uncertain about the safety of irradiated foods. Only 11% expressed irradiated foods are safe. Level of positive attitude towards irradiated foods increased substantially (62%) upon hearing a benefit statement of food irradiation. Purchase intent of irradiated foods was highest (44%) when price is same as unirradiated foods, but significant proportion of consumers indicated to pay 5% premium price for irradiated foods. A successful market for irradiated foods can be achieved by educating consumers with the benefit and uses of irradiation process.

Keywords: Food irradiation; Consumer acceptance survey

1. Introduction

Food irradiation has been shown to be an effective tool to eliminate certain foodborne-pathogens from food (Satin, 1993). It has gained great attention due to its potential for safety assurance of food although it also has many other uses such as insect disinfestations of horticultural products, extension of postharvest life of fresh produce, sprout inhibition in garlic, onion and potatoes (Satin, 1993).

Safety and efficiency of food irradiation has been approved by several authorities (FDA, USDA, WHO, FAO, etc.) and scientific societies based on extensive research (Lagunas-Solar, 1995; Morehouse, 2002). However, market success of irradiated foods has not been at desired level. This is probably due to consumers’ erroneous fear that irradiated foods become radioactive and irradiation could form harmful compounds in food (Resurreccion & Galvez, 1999; Oliveira & Sabato, 2002). Moreover, negative information disseminated by opponents of irradiation could also affects consumer acceptance of irradiated food.

Consumers’ knowledge about food irradiation is inadequate. It has been reported in a study that 72% of consumers in USA were aware of irradiation, but 87.5% of them didn’t know much about it (Resurreccion, Galvez, Fletcher, & Misra, 1995). It is also found in the study that 30% of consumers believed that irradiated food is radioactive. These authors found that benefit statement of food irradiation increased positive attitude of consumers to irradiated foods. On the other hand, unfavorable description of irradiation has a great negative effect on consumer acceptance of irradiated foods (Fox, 2002). A powerful anti-irradiation message can be effectively counteracted and consumer confidence in the safety of irradiation process can be restored by detailed science-based information on irradiation (Fox, 2002). In addition, educational activities and scientific knowledge can improve the image of food irradiation (Resurreccion & Galvez, 1999; Furuta, Hayashi,
Consumers prefer the advantages provided by irradiation process when they are given science-based information including product benefits, safety and wholesomeness of irradiated products (Bruhn, 1998).

Cultural and demographic factors can affect the overall consumer attitudes towards food safety (Wilcock, Pun, Khanona, & Aung, 2004). Although scientific knowledge on food irradiation is reaching consumers in developed countries like the United States, the public awareness and knowledge of irradiation process is very low in other countries (Bruhn, 1995a). Investigation of consumer acceptance of food irradiation in different countries will reflect a global view on this technology. With this perspective Turkish consumer attitudes towards irradiated foods were investigated in this study. Influences of demographic factors, descriptive benefit statements for food irradiation, and relative price levels on acceptance of irradiated foods were examined.

2. Methods

2.1. Questionnaire preparation

A short questionnaire of one page was prepared to encourage consumers’ participation. At the beginning of the questionnaire the purpose was given as “this questionnaire is being made to determine the attitudes of Turkish people towards food irradiation, which is legally allowed to be used to eliminate pathogens from foods in many countries such as European Community, USA, and Turkey”. The questionnaire starts with asking for some general information like gender, age, education, income level, and shopping habits such as frequency of shopping, shopping places and buying criteria. After asking about concerns on food safety issues, a question was asked whether they were aware of food irradiation and the sources of the information. This was followed by asking whether they find irradiation safe or not; and if they want food irradiation be commercially practiced. Next, the following information was given: “raw red meat and poultry products may contain pathogenic microorganisms. These food products can cause diseases if not properly cooked. Irradiation can eliminate these pathogens from raw red meat and poultry products”. They were then asked whether they would purchase irradiated food. Next, they were asked if they would purchase irradiated products produced by companies they trusted. Finally, consumers were asked if they would purchase irradiated foods at 5% cheaper, same, 5% premium price compared to unirradiated foods or never purchase at all. They had the option to indicate more than one price level in this question.

2.2. Questionnaire distribution

The questionnaires were distributed to 31 employees and customers in a big supermarket, 20 employees of a private school, 27 employees in a general office of a bank, 32 employees of a postal service, 34 employees in a hairdresser, and 144 students at a university campus in Istanbul. Total of 444 responses were obtained. The data was collected in an interview. The purpose of the questionnaire was explained to respondents prior to the interview. No identification information of respondents was recorded.

2.3. Evaluation of the questionnaire

Data from 444 completed questionnaires were coded and entered into a Microsoft Excel worksheet and transferred to Microsoft Access for filtering desired categories. Percentage frequencies were obtained to all questions. Respondents’ attitudes toward irradiated foods were evaluated as associated by demographic factors, shopping habits, and benefit statements on food irradiation.

3. Results and discussion

3.1. Demographics and shopping habits

The survey was conducted in Istanbul where about 15% of the population of Turkey lives. Being a good mixture of people throughout the country the population in Istanbul can be a good representation of the population of Turkey. The demographic characteristics of the sample population used in the study represent that of the city population to a good extent as well.

Being 42% male the respondents represented a range of ages, with 79% of them below 40 years old, and only 1% was above 60 years old. In terms of highest education levels of the correspondents, about 60% of them had university degree while 28% high school, 6% secondary school and 5% primary school degree. Consumer samples consisted of different income levels: 45% have low income (up to 0.5 billion Turkish Liras), 51% have medium income (0.5–2 billion Turkish Liras), and 4% have high income (above 2 billion Turkish Liras).

Sell-by date was the most important criteria in purchasing, followed by price and brand. Quite a large fraction of respondents (37%) indicated that they paid attention to sell by date, price, and brand of food product all together before purchase. The most common places for shopping were supermarkets followed by bazaars, small grocery stores and butchers.
3.2. Concerns about food safety issues

Consumer concerns about food safety issues were evaluated by asking their concern about some food processing methods (including irradiation) and potential health hazards in foods. The most concerned issue was bacteria followed by pesticides, hormones, additives, and toxins (Fig. 1). Irradiation was among the least concerned item equivalent to freezing; only 13% of respondents indicated irradiation as a concern. Similar results in which irradiation was less concerned than pesticides, bacteria, additives, and hormones have been reported in literature (Resurreccion et al., 1995).

3.3. Consumer awareness and concerns about irradiation

Consumer awareness and opinion on food irradiation without any given descriptive information was determined. Among the respondents only 29% of them indicated that they had heard food irradiation before. Television programs, school, and newspapers were the major sources of information about irradiation followed by internet, magazines, and radio.

Majority of respondents (80%) were uncertain about the safety of irradiated foods. Only 11% of respondents reported that food irradiation is safe while 9% of respondents indicated it is not safe (Fig. 2). Among those who were aware of food irradiation (29% of respondents) 32% of them expressed that food irradiation is a safe process while 15% of them expressed that it is not.

While majority of respondents were uncertain, 21% of them indicated that they wanted irradiation be practiced in food industry. On the other hand 11% of respondents did not want commercial practice of food irradiation.

Consumer awareness on food irradiation in Turkey (29%) is much lower than that in USA (72%) as reported in a previous study (Resurreccion et al., 1995). Consumers’ negative attitudes towards food irradiation has been associated with their erroneous belief that irradiated food becomes radioactive or can have harmful compounds (Resurreccion & Galvez, 1999). However, the wholesomeness of irradiated foods has been well established and approved by several authorities like FDA, USDA, WHO, American Medical Association, and FAO (Lagunas-Solar, 1995; Morehouse, 2002).

3.4. Responses after statement of benefits for irradiation

We determined the effect of a benefit statement of food irradiation on consumer acceptance of irradiated foods in a similar manner as reported in literature (Resurreccion et al., 1995). The following question was asked to the consumer samples: “Raw red meat and poultry products may contain pathogenic microorganisms. These food products can cause diseases if not properly cooked. Irradiation can eliminate these pathogens from raw red meat and poultry products”, with these given information would you buy irradiated foods? Majority of the consumers (62%) indicated they would buy while 13% expressed that they would not buy irradiated foods (Fig. 3). Twenty-five percent of consumers were undecided to buy irradiated foods (Fig. 3). Effect of gender in this response was not great: 63% of female and 59% of male respondents indicated
they would buy irradiated foods. Age did not affect the purchase intent in this question, but as the education level increased the purchase trend of irradiated foods increased. Acceptance of irradiated foods increased and the proportion of uncertain consumers about safety of irradiated foods decreased with increase in income level.

Hearing a benefit statement changed consumers’ opinion on safety of food irradiation (Fig. 4). Fifteen percent of the consumers who indicated that irradiated food was not safe prior to hearing the benefit statement expressed that they would buy irradiated foods, while 62% of them were uncertain to buy them (Fig. 4). Moreover, 64% of the respondents who were uncertain about safety of irradiated foods indicated that they would buy irradiated foods upon hearing the benefit statement (Fig. 4). We also found that the consumer acceptance increased to 66% if highly trusted companies produce irradiated foods.

These results indicate that if consumers are educated on the benefit of food irradiation and if trusted companies manufacture irradiated foods the acceptability of irradiated products by consumers will likely increase. Similar results in which benefit statements, educational activities and science-based information increased consumer acceptance of irradiated foods have been reported in literature (Resurreccion et al., 1995; Bruhn, 1998; Fox & Olson, 1998; Resurreccion & Galvez, 1999). Resurreccion and Galvez (1999) did a focus group discussion with 30 consumers and found that consumers were unaware of benefits, safety, and accumulated scientific research results of food irradiation. They found that consumers have confidence in nonprofit organizations including universities, and they presented a detailed description of effective educational programs for consumers. Thus, an investment in consumer education about the irradiation process is needed to achieve successful market for irradiated foods and as a result of that substantial reward in food safety, food quality, and environmental safety can be obtained (Bruhn, 1995b).

3.5. Effect of price level and overall purchase trend

Consumers were asked to select one or more of the followings to determine the effect of price on acceptance of irradiated foods and their final opinion: ‘would buy irradiated foods if their price is 5% cheaper’, ‘would buy irradiated foods if their price is same’, ‘would buy irradiated foods if their price is 5% premium’, ‘never buy’, ‘undecided’.

Purchase intent for irradiated food was greatest (44%) if the price would be same as unirradiated foods (Fig. 5). Higher preference of irradiated foods at same price was also reported in earlier studies (Fox & Olson, 1998).

The fraction of the respondents who indicated that they would pay 5% premium price for irradiated foods was 23%. It has been reported that a higher fraction of consumer (50%) were ready to pay more for irradiated foods (Bruhn, 1995a). Fox and Olson (1998) found that 31% and 15% of respondents would pay, respectively, 10% and 20% premium for irradiated foods. The fraction of consumers who would pay premium for irradiated foods was lower in our study compared to the fractions reported in other studies conducted with consumers in USA (Bruhn, 1995a; Fox & Olson, 1998). This may be due to the fact that the
purchasing power of consumers in Turkey is lower than in the US.

Relatively small fraction of respondents (19%) expressed purchase intent if it is sold 5% cheaper. The fraction of respondents who would buy irradiated foods only at 5% cheaper price was 12%. This is not in agreement with the result obtained by Fox and Olson (1998). These authors found that the preference of irradiated chicken was greater at discounted prices. It is hard to explain the lower purchase trend at cheaper price observed in our study, but it could be due to that the consumers may have tendency to associate lower prices with lower quality. They also may get suspicious with a lower price for better quality product obtained by irradiation. Consumers seem to feel more comfortable with the irradiated product sold at the same price as unirradiated ones.

Consumers were allowed to indicate more than one choice in this question and some of them did indicate multiple choices. For example, 5% of the consumer sample reported that they would purchase irradiated food at same or 5% premium price; 6.7% of them would purchase if the price is same or 5% cheaper; and 3% of them indicated that they would purchase at all three price levels.

At the end of the survey 18% of consumer sample indicated that they would never buy irradiated foods, while 8% of them remained undecided. We did not find any correlation between the income level and the purchase trend as affected by prices.

4. Conclusions

Consumer acceptance of irradiated foods largely depends on the awareness and knowledge of the benefits and use of irradiation process. The awareness and acceptance of irradiation process by Turkish consumer are relatively low (29%) compared to developed countries like United States. This is associated with the lack of knowledge about the process. Hearing a benefit statement increased the acceptance of irradiated foods substantially. Acceptance of irradiated foods would be greater if their price is same as that of unirradiated foods. If a successful market is achieved, irradiated foods can have a great contribution to food safety and quality, and public health. This can be achieved by educating consumers with the benefit and uses of food irradiation. More efforts and investments are needed to provide consumers with scientific and credible information about food irradiation in developing countries (like Turkey) where irradiation process is not well known. Public education about the process can be provided at schools, media, conferences and educational fairs to promote market success of irradiated foods.

References