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Turkish preschool staff's opinions about hormones, additives and genetically modified foods

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Abstract

Most of the meals served at preschools are purchased and cooked by preschool staff in Turkey. This study delves preschool staff's opinions about additives, hormones, and genetically modified organisms (GMO). The data were collected from preschool staff using the *Preschool Food Survey (PFS).* We have found that preschool supervisors and teachers have some knowledge about the food prepared in their preschool. While there are no significant differences in between the opinions of preschool supervisors and teachers regarding to serving enriched food products, there are some significant differences among supervisors, teacher assistants and kitchen staff regarding to serving enriched foods. It is suggested that preschool staff be trained about GMO.

Keywords: Preschool; staff; perception; additive; hormone; genetically modified food.

1. Introduction

Hormones are chemicals produced in the bodies of all humans and animals. Hormones may be produced in small amounts yet; they control important body functions such as growth and development. Because of these functions of hormones in body, they are used in animals to make young animals gain weight faster. Hormones are also used in dairy cows to increase milk production as well. It is a fact that using hormones in animals increases the profitability of the meat products and dairy industries.

Using hormones in animals brought the safety concerns that whether hormone residues in meat or dairy products cause any human health effects. There have been a couple of incidences showing that exposure to hormones in meat were suspected as the cause of early puberty in girls in Puerto Rico and Italy, but it was never

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confirmed (Partsch & Sippell, 2001). Short term studies in laboratory rats have not indicated a concern about milk related allergies or immune effects from exposure to hormone related milk or dairy products (Rasanen *et al.,* 2006). However, short term studies cannot be used to exclude all possibilities of any unexpected health effects after a long-term exposure. While the debate on whether growth hormones should or should not be used for food production carries on, European Union (EU) prohibits all meat products from animals treated with steroid growth hormones (Partsch & Sippell, 2001). This sanction is still in effect. Both EU and Canada prohibited the use of protein hormone, recombinant bovine growth (rbGH) in dairy cattle. This hormone has US Food and Drug Administration's (FDA) approval in the USA. Besides the hormones in food, there are about five thousand additives used in food products.

A food additive is any substance not commonly regarded or used as food, which is added to, or used in or on, food at any stage to affect its keeping quality, texture, consistency, taste, color, alkalinity or acidity, or to serve any other technological function in relation to food, and includes processing aids in so far as they are added to or used in or on food (Taylor, 1980). The use of additives in food and liquid has increased immensely in the last decades. The main reason, given by food manufacturers for using additives is that food would spoil in a short time without additives. Conversely, only 2% of the additives in food are preservatives. Major parts of the inorganic additives are used for cosmetic reasons (Shibamoto *et al.,* 1993). There is another argument concerning additives in food. Some countries already limited some food products in schools because ingredients or additives of those products may cause health/behavior problems in children (Wegrzyn *et al.,* 2001; Fried & Nestle, 2002; Garner, 2008). Furthermore, there is research asking to ban the usage of all unnecessary additives consumed by infants and young children (Tuormaa, 1994).

Genetics of living organisms have been modified since 1970's using contemporary biotechnological methods. The first genetically modified food (GM food), tomato, was produced and traded in the market in the early 1990's (Kiymaz & Tarakcioglu, 2004). There are several GM foods, such as zea mays (corn), tomato, potato, rice, soy, wheat, pumpkin, sunflower, peanut, some fish, colza, cassava and papaya, consumed by people in the world. According to Cummins and Lilliston (2000), it is possible that biscuits, vegetable oil, baby food, chocolate and ready soups might have GM ingredients. According to Smith (2002), 51% of soy, 20% of cotton, 12% of canola and 9% of corn growth all around the world has transgenic kind. When we consider the population growth in the world and its changing climate, it is expected that the production of GM foods will be increased. There should be some dependability norm on these products because there is limited research on GM foods and its long term effects.

There has been a doubt that whether GM food causes allergies on human beings or damages the immune system (Goodman, 2005). One hazelnut gene was transferred to a soybean in Brazil in the middle of 1990s. It was observed that people who ate these soybeans had allergic reactions. After this incidence, it was concluded that one gene which has been transferred to another organism can alter the genes of the host product (Donna *et al.,* 1999). This hypothesis raises the concerns about the side effects of GM foods.

Genetic engineers use "antibiotic resistant gene" to mark genetically modified crops. This means that these products carry antibiotic resistant genes. While these products become resistant to the harmful bacteria and can stay longer without getting spoiled, these bacteria may become resistant to the antibiotics. This may affect human immune system not to be able to fight with these new resistant bacteria (Goldstein, 2005). This phenomenon is being questioned whether there is a health risk for next generations.

Labeling GM ingredients on the products is mandatory in the European Union (Vogt & Parish, 2001). It was also found that consumers are typically unaware of the labeling indicating GM content (Noussair *et al.,* 2001). Several Japanese consumer groups insisted on mandatory labeling of GM food products in Japan. Furthermore, they emphasized that GM products are not being adequately tested for safety. Many school lunch programs in Japan serve non-GM foods to the extent possible despite the efforts of the Japanese Ministry of Agriculture to convince consumers that GM products are safe to eat (McCluskey *et al.,* 2003). Then, Japanese companies reduced the amount of GM crops (Tolbert, 2000). The United States is the world's leading country in research, development, and sales of genetically modified organisms (GMOs) (Ganiere *et al.* 2006). In the meantime, FDA has no formal approval process for GM foods but relies on biotechnology companies which also profit from the sale of genetically engineered (GE) crops to assess their safety. One third of the milk which has been produced in the US is fertilized by GM bacteria today (Hulse, 2004). Yet, many GM foods marketed in the US are banned or strictly regulated in Europe, Japan, and other regions (Nielsen & Anderson, 2001).

Importing GM products was permitted by the Turkish Government in 2007. Consumer groups and some other non-governmental organizations objected to this new bill. Besides their concerns about GM food's risk factors, they stated that there are regulatory matters and labeling issues not ruled by law. Turkish Government postponed the importation of GM food right before the legislation was in effect until they put the criteria in order. There is not enough information on the bio-security bill arranging the trade of GM food in market yet. It's a fact that GM products will be on the market soon regardless of any questions.

Children's bodies react more differently in exposure, absorption, tissue distribution, ability to biotransform and elimination of biological chemicals than adults (Scheuplein *et al.,* 2002).The National Academy of Sciences has documented children's special vulnerability to the toxic effects of chemicals (Landrigan *et al,* 1999). Children may individually react the same or differently to the same biological chemicals such as additives, hormones, and GMOs. There are children attending preschools and have their breakfast and/or their lunch and supper in their schools. Most of the meals served at preschools are purchased and cooked by preschool staff in Turkey. It is essential for preschool staff to know about hormones, additives and GMOs since they serve the children and the children can't control their food. In several studies, it has been explained that the consumption of GM food is mostly related to the consumers' perception of GM food. It has been found that socio-economic and education levels of consumers have no effect on buying GM products (Baker and Burnham, 2001). This study aimed to determine Turkish preschool employees' knowledge and use of hormones, additives and GMOs in their school meals.

2. Methodology

Data collected using the PFS survey. There were 20 questions in the survey including 5 demographic items. The survey questions obtained from the literature and modified to meet the research agenda. There were 25 questions initially and lowered to 20 according to three expert opinions. The PFS was administered to 150 preschool staff for reliability issues. The list of employees was gathered from 17 randomly selected preschools. The list was used as a pool for sampling procedure. Each person's name was randomly selected from the pool and dropped back to the pool to keep the chance of being selected the same for all the participants. After the collection of employees, pre-test and post-test were administered in a-week period. The Cronbach's Alfa reliability coefficient (α) was used for reliability measures and found to be 0.77.

This study involved 75 preschool staff (15 supervisors, 35 teachers, 10 teacher assistants and 15 kitchen staff) from 11 (out of 48) private preschools supervised by The Ministry of National Education in the capital city of Turkey, Ankara. Because of the differences in group sizes, the Kruskal Wallis one-way analysis of variance (K) was used to determine whether there were significant differences in given answers in relation to the education level, title and year in job. Where K score showed significant difference in given answers, one way analysis of variance (ANOVA) was applied to examine those items.

3. Results

Table 1. Participant Characteristics

Items	Characteristics	f	%
Gender	Male	8	10.7
	Female	67	89.3
	Total	75	100.0
Age	18-24	11	14.7
	25-34	35	46.7
	35-44	26	34.7
	44 and up	3	4.0
	Total	75	100.0
Education Level	Elementary	5	6.7
	High	20	26.6
	Bachelor	45	60.0
	Graduate	5	6.7
	Total	75	100.0
Title	Supervisor	15	20.0
	Teacher	35	46.7
	Teacher Assistant	10	13.3
	Kitchen Staff	15	20.0
	Total	75	100.0
Years in Job	One year or less	5	6.7
	1-5 years	25	33.3
	6-10 years	25	33.3
	11 years and up	20	26.7
	Total	75	100.0

Table 1 shows that 8 (out of 75) (10.7%) of the participants were males and 67 (89.3%) of them were females. 11 (14.7%) of them were between ages of 18 and 24, 35 of them were between ages of 25 and 34, 26 (34.7%) of them were between ages of 35 and 44 (4.0%) and only 3 of them were 44 years old or older. 5 (6.7%) of the participants had elementary degrees, 20 (26.6%) of them had high school degrees, 45 (60.0%) of them had bachelor degrees and 5 (6.7%) of them had graduate degrees. 15 (20.0%) of the participants were supervisors, 35 (46.7%) of them were teachers, 10 (13.3%) of them were teacher assistants and 15 (20.0%) of them were kitchen staff. 5 (6.7%) of the participants have been working one or less than one year, 25 (33.3%) of them have been working 1-5 years, 25 (33.3%) of them have been working 6-10 years and 20 (26.75%) of them have been working 11 or more years in the field.

Table 2. What is important for you when you purchase foods?

Importance	f	%
Price	4	5.3
Variety	10	13.3
Quality	26	34.7
All	35	46.7
Total	75	100.0

Table 2 shows that 4 (5.3%) of the participants thought price, 10 (13.3%) of them thought variety, 26 (34.7%) of them thought quality and 35 (46.7%) of them thought price, variety and quality were important.

Table 3. Where is the food prepared for your school?

Place	f	%
Preschool's Kitchen	71	94.7
Private Company	0	0.0
Parents	0	0.0
Other	4	5.3

Total	75	100.0

Table 3 shows that 71 (94.7%) of the participants mentioned that the food prepared for the school was prepared in the preschool's kitchen.

Table 4. If the food you serve is prepared in your preschool's kitchen, who purchases the food mostly?

Person	f	%
Supervisor	0	0.0
Teacher	48	64.0
Kitchen Staff	0	0.0
Commission	24	32,0
Other	3	4.0
Total	75	100.0

Table 4 shows that 48 (64.0%) of the participants mentioned that teachers purchased the food for the preschool mostly, 24 (32.0%) of them mentioned that a commission of teachers and supervisors purchased the food for the preschool.

Table 5. If the food you serve is prepared in your preschool's kitchen, where is the food purchased?

Food Source	f	%
Local Supermarket	10	13.3
Local Butcher and Grocery	45	60.0
Local Bazaar	0	0.0
Hypermarket	5	6.7
Wholesaler	15	20.0
Total	75	100.0

Table 5 shows that 10 (13.3%) of the participants pointed out that the food purchased for the preschool was purchased from the local supermarkets, 45 (60.0%) of them pointed out that it was purchased from the local butchers and grocers, 5 (6.7%) of them pointed out that it was purchased from the hypermarkets and 15 (20.0%) of them pointed out that it was purchased from the wholesalers.

Table 6. How informed are you about hormones, additives and genetically modified foods?

Knowledge	f	%
Very much informed	5	6.7
A little informed	62	82.7
Not informed	8	10.7
Total	75	100.0

Table 6 shows that 5 (6.7%) of the participants believed that they were very much informed, 62 (82.7%) of them believed that they were a little informed and 8 (10.7%) of them believed that they were not informed about hormones, additives and genetically modified foods.

Table 7. Where did you get the information associated with hormones, additives and genetically modified foods?

Information Sources	f	%
Newspaper / Brochure	8	10.7
TV	50	66.7
Magazine	2	2.7
Meeting	0	0.0
Other	15	20.0
Total	75	100.0

Table 8. Do you think there is a risk for human health in consumption of food with hormones, additives and genetically modified foods?

Items	Risk	f	%
Hormone	High Risk	55	73.3
	Low Risk	16	21.3
	No Risk	4	5.3
	Total	75	100.0
Additive	High Risk	43	57.3
	Low Risk	28	37.3
	No Risk	4	5.3
	Total	75	100.0
GM Food	High Risk	59	78.7
	Low Risk	13	17.3
	No Risk	3	4.0
	Total	75	100.0

Table 8 shows that 55 (73.3%) of the participants thought that there was a high risk for human health in consumption of food with hormones, 16 (21.3%) thought that there was a low risk for human health in consumption of food with hormones and 4 (5.3%) of them thought they did not think there was a risk for human health in consumption of food with hormones. 43 (57.3) of them thought that there was a high risk for human health in consumption of food with additives, 28 (37.3%) of them thought that there was a low risk for human health in consumption of food with additives and 4 (5.3%) of them thought they did not think there was a risk for human health in consumption of food with additives. 59 (78.7) of them thought that there was a high risk for human health in consumption of food with genetically modified foods, 13 (17.3%) of them thought that there was a low risk for human health in consumption of food with genetically modified foods and 3 (4.0%) of them thought they did not think there was risk for human health in consumption of food with genetically modified foods.

K test showed that there were no significant differences between the education levels (K=0.542), titles of the participants (K=0.632) years in job (K=0.741) and their assessment of risk of hormones, additives and genetically modified foods.

Table 9. Do you buy genetically modified foods?

Buying	Frequency	f	%
	Often	0	0.0
Buying GM food	Sometimes	5	6.7
	Rarely	45	60.0
	Never	22	29.3
	Not sure	3	4.0
	Total	75	100.0

Table 9 shows that 5 (6.7%) of the participants sometimes buy genetically modified foods, 45 (60.0%) of them rarely buy them, 22 (29.3%) never buy them and 3 (4.0%) of them are not sure whether they buy them.

Table 10. Do you serve genetically modified foods with additional vitamins or nutrients?

Serving	Frequency	f	%
	Often	0	0.0
Serving GM food	Sometimes	0	0.0
with additional	Rarely	12	16.0
vitamins or nutrients	Never	58	77.3
	Not sure	5	6.7
	Total	75	100.0

Table 10 shows that 12 (16.0%) of the participants mentioned that they serve GM foods with additional vitamins or nutrients, 58 (77.3%) mentioned that they never serve them and 5 (6.7%) mentioned that they are not sure whether they serve them or not.

Table 10.1 ANOVA Scores of Education Level, Title and Serving genetically modified foods with additional vitamins or nutrients

Demographics	ANOVA	N	X	S	F	P	Difference (LSD)
	Elementary	5	4.00	0.70	3.673	0.009	4-1
Education Level	High School	10	3.60	0.51			4-2
	Bachelor	10	3.60	0.69			
	Graduate	45	4.04	0.30			
	Supervisor	15	4.00	0.37	3.378	0.023	1-3
Title	Teacher	35	4.02	0.29			2-3
	Teacher Assistant	10	3.60	0.69			2-4
	Kitchen Staff	15	3.73	0.59			

According to Table 11.1, it was found that there were significant differences in groups. ANOVA test shows that preschool personnel who have a graduate degree do not serve GM food with additional vitamins or nutrients comparing to the personnel who have an elementary and high school degree. Supporting these results, ANOVA test shows that supervisors do not serve GM food with additional vitamins or nutrients comparing to teacher assistants and teachers do not serve GM food with additional vitamins or nutrients comparing to teacher assistants and kitchen staff.

Table 11. How often do you read the ingredients on the labels of the foods?

Reading	Frequency	f	%
	Often	11	14.7
Reading ingredients	Sometimes	54	72.0
	Rarely	8	10.7
	Never	2	2.7
	Not sure	0	0.0
	Total	75	100.0

Table 11 shows that 11 (14.7%) of the participants mentioned that they often read the ingredients of the label on the foods, 54 (72.0%) of .hem mentioned that they sometimes read them, 8 (10.7%) mentioned that they rarely read them and only 2 (2.7%) mentioned that they never read them.

K test showed that there were no significant differences between the participants' education levels (K=0.58), titles of the participants (K=0.74) and years in job (K=0.70) and their opinions related with how frequently they read the ingredients on the labels. Our results indicated that there were significant differences between the education levels (K=0.024), title of the participants (K=0.03) and serving GM foods with additional vitamins or nutrients.

Table 12. How much is it important for you that the foods have the labels with written ingredients?

L: bel	f	%
Very nuch	48	64.0
A litt ɜ	27	36.0
Total	75	100.0

Table 12 shows that 48 (64.0%) of the participants thought that the foods had the labels with the written ingredients were very important and 27 (36.0%) of them thought that it is somewhat important.

K test showed that there were no significant differences between the education levels (K=0.67) and titles of the participant (K=0.65) and years in job (K=0.62) and their opinions about whether foods should have labels.

Table 13. Would you like to be informed about hormones, additives and genetically modified foods?

Informed	f	%
Yes	72	96.0
No	0	0.0
I don't know	3	4.0
Total	75	100.0

Table 13 shows that 72 (96.0%) of the participants mentioned that they would like to be informed about hormones, additives and genetically modified foods and 3 (4.0%) of them mentioned that they did not know whether they would like to be informed about them.

K test showed that there were no significant differences between the education level (K=0.67), titles of the participants (K=0.67) and years in job (K=0.66) and their opinions about whether they would like to be informed on hormones, additives and genetically modified foods.

Table 14. Have you ever purchased any genetically modified food with a "genetically modified food" label?

Purchasing GM food	f	%
Yes	52	69.3
No	18	24.0
I don't know	5	6.7
Total	75	100.0

Table 14 shows that 52 (69.3%) of the participants pointed out that they purchased a genetically modified food with a "genetically modified food" label, 18 (24.0%) of them pointed out that they did not purchase any and 5 (6.7%) pointed out that they did not know whether they purchased any.

Table 15. Purchased genetically modified food with a "Genetically Modified Food" label

GM Label	f	%
Watermelon	20	38.4
Tomato	18	34.6
Rice	10	19.3
Grapes	4	7.7
Total	52	100.0

Table 15 shows that 20 (out of 52) (38.4%) of the participants believed that they purchased watermelon with a "GM Food" label, 18 (34.6%) of them believed that they purchased tomato with a "GM Food" label, 10 (19.3%) of them believed that they purchased rice and 4 (7.7%) of them believed that they purchased grapes with a "GM Food" label.

4. Conclusion

This study demonstrated that most of the private preschools operated in Ankara have their kitchens to prepare food and serve their children. This study aimed to evaluate preschool staff's (supervisor, teacher, and teacher assistant and kitchen staff) knowledge about hormones, additives and genetically modified organisms related to food sector. Our survey (PFS) showed that they have some information about hormones and additives and GM foods. Furthermore, preschool personnel were all in agreement about these products' risk factor on human health. This finding was supported by McCluskey's study (2003) conducted in Japan that school staff resisted against serving/using foods with hormones, additives and GM organisms.

Supervisors and teachers involved in this study stated that they did not serve enriched products while teacher assistants and kitchen staff said that they served some. There may be two reasons for the difference in the group. The first, some school personnel do not have enough information about organic and inorganic additives. They might think that all enriched products contain hormones and inorganic chemicals. The second, the kitchen staff and teacher assistants might not read the ingredients because they are not involved in purchasing process.

Most of the preschool staff stated that they personally purchased GM products. On the other hand, there is not any GM food on the Turkish market yet. When we examined the items they purchased (Table 15), it was understood that preschool personnel had confusion about food with hormones and GM organisms. They do not have enough information to separate and recognize foods with hormones and foods with GM organisms. Similar findings was presented in Noussair's study (2002) conducted in Europe. European consumers also had difficulty in recognizing foods with hormones and foods with GM organisms.

Preschool staff seemed to read the ingredients of the foods they purchased. This finding is in contrast with the study of Noussair *et al.* (2002). The reason for preschool personnel's sensitivity about the foods and the ingredients may be because they are professionals and they have a responsibility towards the children.

GM food will be traded in the Turkish market soon. According to our results, preschool staff should be trained about GM organisms, hormones and additives. Their current knowledge came mainly from TV and then, the newspapers. Because this information is not on a formal base and there is no control on the learning of the viewers, a formal education is needed.

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