

Determination of Knowledge on the Academic Staff Concerning Genetically Modified Organisms (GMOs)

Akademik personellerin genetiği değiştirilmiş organizmalar (GDO) hakkındaki bilgi düzeylerinin belirlenmesi

Research Article

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ABSTRACT

This study aimed to determine the knowledge, attitude and behavior level of the academic staff at Bitlis Eren University (BEU) related to GMOs. The general information levels (GILs) were found not to be significant ($p > 0.05$), in terms of gender, age, department, education level and title, but found to be significant ($p < 0.05$) in terms of marital status. The GILs were changing between 19 and 36 and were 28.1 ± 3.1 on average. According to these data, it can be said that academic staff have a medium of knowledge about GMOs. They have stated that GMOs are commonly used in agriculture fields (91.7%); they are mostly informed via TV/radio or the internet (34.0%); the most reliable resources are universities (69.9%); they want to be mostly informed about its benefits, risks (75.0%) and its place in Turkey (51.3%); they think they consumed GMOs (75.6%), they are not informed about labels (76.9%), they do not have enough information (60.9%) and that they want to be informed (92.9%) about the topic. The academic staff said that the effects of GMOs are too dangerous, they do not find the applications ethique, they wouldn't consume GMOs and they were absolutely against to the import of GMOs. In conclusion, it has been revealed that more information is necessary about GMOs as they will be very important for the new generations.

Key Words

Academic Staff, BEU, Cross-sectional study, GMOs, Mann-Whitney, Kruskal Wallis H Test.

ÖZET

Bu çalışmada; Bitlis Eren Üniversitesi (BEÜ) akademik personellerinin GDO konusunda bilgi tutum ve davranışlarının belirlenmesi amaçlanmıştır. Genel bilgi seviyeleri, cinsiyet, yaş, bölüm, eğitim düzeyi ve ünvan açısından anlamlı bulunmamış ($p > 0.05$); fakat medeni durum açısından anlamlı ($p < 0.05$) bulunmuştur. Genel bilgi seviyeleri 19 ve 36 puan arasında değişmekte olup, ortalama 28.1 ± 3.1 'dir. Bu verilere göre; akademik personellerin GDO konusunda orta düzeyde bir bilgiye sahip olduğu söylenebilir. GDO'ların daha çok tarım alanında kullanıldığını (% 91.7), radyo/TV, internet yoluyla bilgilendiklerini (% 34.0), en güvenilir kaynağın üniversiteler olduğunu (% 69.9), daha çok faydaları ve riskleri (% 75.0) ile Türkiye'deki durumu (% 51.3) hakkında bilgilenecek istediklerini ve ayrıca; bu ürünleri tükettiklerini düşündüklerini (% 75.6), etiketlemeler (% 76.9) ile konu hakkında (% 60.9) bilgi sahibi olmadıklarını ve bilgilenecek istediklerini (% 92.9) ifade etmişlerdir. GDO'nun etkilerinin çok tehlikeli olduğunu, genetik uygulamaları etik bulmadıklarını, tüketmeyeceklerini ve ithaline kesinlikle karşı olduklarını belirtmişlerdir. Sonuç olarak; GDO yeni nesiller için oldukça önem arz edeceğinden daha fazla bilgiye gereksinim olduğu ortaya çıkmıştır.

Anahtar Kelimeler

Akademik Personeller, BEÜ, Kesitsel Çalışma, GDO, Mann-Whitney, Kruskal Wallis H Testi.

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INTRODUCTION

GMOs can be defined as organisms whose genetic constitution has been modified by gene technology [1]. GMOs may be used in a broad sense to include all life forms, but the most common application of the term is limited to confine GM plants and animals. The annual increase in commercial plantings of GMOs has risen with an average of approximately 10% over the last decade [2].

The first commercial GM plant (the FlavrSavr tomato) was authorised for marketing in 1994 [3]. It was more future oriented than the majority of the currently marketed first generation GMOs in someways. GMOs occupied more than 143 million ha in 23 countries, with soybean, cotton, maize and rapeseed (canola) as the dominant crops in 2007 [4]. GM plants can offer several benefits for agricultural practice, food quality, nutrition and health [5], and also have higher nutritional values, longer storability and higher crop yields [6].

The report [7] concluded that commercially produced GM crops are designed to confer resistance to insect pests and to produce tolerance to specific herbicides. This can lead to a reduction in the use of pesticides. As with all new technologies, potential risks exist and GM technology is not different. Two main issues are: (i) the transfer of the introduced genes to wild plants and non-GM crops and (ii) the indirect effects of the GM crops in the environment, e.g., effects on non-target insect, weed population, the possible development of resistant insects and weeds [8]. It is also possible that GM technology can lead to unpredictable harmful changes in the nutritional status of foods, though this can also happen with conventional techniques. Finally, there is the possibility that the biodiversity of wildlife can be modified as a result of the changes in the availability of food [9].

The use of GM ingredients in food products has been highly controversial and worldwide consumer response toward these products has been largely negative [10]. It is estimated that GM crops cover almost 4% of total global arable land [11]. In spite of its widespread use, a majority of consumers continue to be relatively uninformed about biotechnology

and the resulting prevalence of GM ingredients in processed food products [12]. Consumers could be prejudiced because of being uninformed. Although GM foods take a nation-wide market place in Turkey, Turkish consumers do not have enough information about these types of products [13]. There has been different studies about the importance of the topic recently [14-21].

For that reason, this study aims to determine the knowledge, attitude and behavior level of the academic staff of BEU about GMO.

MATERIAL AND METHOD

The data used in this study were obtained from the survey that was carried out on the academic staff of Bitlis Eren University (BEU). The socio-demographical characteristics of the participants and their data were collected by using a questionnaire developed by the researcher. It was applied to 156 people who were chosen with simple random sampling. This cross-sectional study was conducted between January and February 2012. Descriptive statistics were presented as frequency and percentage. In the data analysis, Mann-Whitney test was used for gender variable, and also Analysis of Variance (ANOVA) and Kruskal Wallis H test were applied in terms of branch, graduation, title, marital state variables by examining the normality hypotheses. By analyzing validity and reliability in measure, differences at $p < 0.05$ were considered to be significant.

RESULTS AND DISCUSSIONS

156 people participated in the study: 70.5% of whom were male, 29.5% female, 58.3% married, 41.7% single, 35.3% MA graduate, 32.7% PhD graduate, 32.1% BA graduate while average age of participants were 32.8 ± 5.9 (min:22 max:52) and 50.6% of them were between 29-35, 24.4% between 29 and younger, 25.0% 35 and over. 37.2% of them were lecturers, 31.4% associate professors, 25.0% research assistants, 6.4% others (instructors and expert lecturers) and 34.6% of them were at faculty of science and arts, 37.2% vocational school, 11.5% engineering, 10.9% college and 5.8% faculty of economics and

administration (Table 1). The GILs of academic staff were changing between 19 and 36 and were 28.1 ± 3.1 on average (Table 1). Percentiles of the GILs were calculated and found to be in the medium level. According to these data, it can be said that academic staff have a medium of knowledge about GMOs. However, the GILs of the academic staff were found not to change ($p > 0.05$), in terms of gender, age, department, education level and title but found to change ($p < 0.05$) in terms of marital status (Table 1). As the other researchers reveals, it has been stated that the GILs of the participants may differ in terms of age, gender, marital status, department, education level and title, and the basic reason may be socio-economic and geographical conditions [14, 16].

Academic staff have stated that GMOs are commonly used in agriculture (91.7%), animal husbandry (16.7%) and health (10.3%) fields; they are mostly informed via TV/radio or the internet (34.0%); the most reliable resources are universities (69.9%) and formal institutions (37.2%); they want to be mostly informed about its benefits, risks (75.0%) and its place in Turkey (51.3%); they think they consumed GMOs (75.6%), they are not informed about labels (76.9%), they do not have enough information (60.9%) and that they want to be informed (92.9%) about the topic (Table 2). In another study [17, 22], it has been revealed that information about GMOs is taken (42.0-90.0%) from TV/radio, internet and newspapers. The fact that Chinese do not have enough information

Table 1. Some of the features of academic staff participated in the study.

Demographic Features	GIL				Test statistic values	p
	N	(%)	$\bar{X} \pm SD$	min-max		
Gender						
Female	46	29.5	28.3 ± 3.1	19-36	MW= 2217.500	0.222
Male	110	70.5	27.8 ± 2.9	23-35		
Ages						
29 below	38	24.4	28.5 ± 2.5	24-32	KW= 1.047	0.592
29-35	79	50.6	27.9 ± 3.3	19-35		
35 and over	39	25.0	28.1 ± 3.1	23-36		
Marital status						
Married	91	58.3	$27.7 \pm 3.1^*$	19-36	MW= 2340.000	0.026**
Single	65	41.7	$28.7 \pm 2.9^{**}$	22-35		
Types of faculty						
Arts and sciences	54	34.6	28.3 ± 2.9	22-35	F= 0.286	0.887
Economics and administration	9	5.8	28.8 ± 3.3	24-34		
Engineering	18	11.5	28.2 ± 2.5	23-32		
College	17	10.9	28.1 ± 2.9	23-32		
Vocational school	58	37.2	27.8 ± 3.4	19-36		
Graduation						
BA degree	50	32.1	27.6 ± 3.2	19-34	F= 1.406	0.248
MA degree	55	35.3	28.6 ± 2.9	23-34		
PhD degree	51	32.7	28.1 ± 2.9	22-36		
Titles						
Lecturer	58	37.2	27.8 ± 3.4	19-34	F= 1.019	0.386
Research Assistant	39	25.0	28.8 ± 2.7	23-34		
Assist. Prof.	49	31.4	28.1 ± 3.0	22-36		
Others	10	6.4	27.3 ± 2.6	23-31		
Total	156	100.0	28.1 ± 3.1	19-36		

about GMOs is attributed to not presenting the topic in media [15-16]. It can be said that the data (Table 2) differs from the data of other researchers verileri [14-17] and this may depend on people's education level, economic conditions, minimum livelihood and information resources.

Table 2 shows the ratio of academic staff who think they consumed these products as 75.6% and it has been observed that this ratio in our country is 77.7-83.2% [19, 21], in EU countries, China and Indonesia 43.2-62.0% [14-15, 18]. The reason for the differences may result from people's cautious approaches to these foods in the market. Moreover, participants (76.9%) have stated that they haven't seen any information on the products they have bought whether they are GMOs or not (Table 2). It has been revealed that 92% of the consumers are careful whether there is label or not [23], but some are less conscientious [20]. This situation may result from the fact that people do not believe the

information of food business. It has been evaluated that compulsory labelling will be suitable in Turkey, China and Indonesia [16-19, 24]. It is thought to be useful to carry out campaigns with the help of experts and to include academic staff in these activities in order to increase the awareness of the society about the safe consumption of food.

While the participants find GMOs risky in terms of eliminating natural products in time (59.6%), ruining natural balance (53.2%), making agricultural production dependent on importing (38.5%), giving harm to human health (49.4%), eliminating rights of consumers (35.9%) and damaging farmers (35.3%); but 39.1% of them said that they had no idea about combining GMOs with other products (Table 3). In similar studies, it was observed that GMOs are dangerous for all livings in nature [14-17, 19, 21], but there are more positive approaches in developing countries [25]. In this aspect, our study support the data of other researchers.

Table 2. Information sources and needs, consumption status and usages about GMOs.

Usages , Information Sources and Needs*							
Usages	N	%					
Agriculture	143	91.7					
Animal Husbandry	26	16.7					
Health	16	10.3					
Information source							
Radio/TV, internet	53	34.0					
Environment	26	16.7					
General Opinion	8	5.1					
Label Information	2	1.3					
Conferences	13	8.3					
The most reliable source informing you							
Media	12	7.7					
Formal institutions	58	37.2					
Universities	109	69.9					
Private sector	4	2.6					
Volunteer institutions	31	19.9					
The topic wanted to be known about GMOs							
Benefits and risks	117	75.0					
Way of production	44	28.2					
Status in Turkey	80	51.3					
Getting information and consumer rights	52	33.3					
Consumption Status and Getting Information							
		Yes		No		No idea	
	N	%	N	%	N	%	
Do you think you consumed products with GMOs?	118	75.6	18	11.5	20	12.8	
Did you see any information on the products you bought whether they had GMOs or not?	7	4.5	120	76.9	29	18.6	
Do you think you are informed about the products with GMOs?	59	37.8	95	60.9	2	1.3	
Do you want to be informed about the products with GMOs?	145	92.9	8	5.1	3	1.9	

* More than one option was chosen.

Table 3. Some of the opinions of academic staff about GMOs

Feeling of risk	Too risky		Risky		No idea		Acceptable		Riskless	
	N	%	N	%	N	%	N	%	N	%
Giving harm to human health	57	36.5	77	49.4	12	7.7	9	5.8	1	0.6
Ruining natural balance	83	53.2	54	34.6	14	9.0	3	1.9	2	1.3
Combining GMOs with other products	24	15.4	49	31.4	61	39.1	6	3.8	16	10.3
Making agricultural production dependent on importing	60	38.5	45	28.8	35	22.4	9	5.8	7	4.5
Damaging farmers	50	32.1	55	35.3	33	21.2	8	5.1	10	6.4
Eliminating consumer rights	56	35.9	49	31.4	29	18.6	10	6.4	12	7.7
Eliminating natural products	93	59.6	47	30.1	9	5.8	1	0.6	6	3.8
Ethique attitudes toward genetic practices	Too dangerous		Dangerous		No idea		Acceptable		Absolutely true	
	N	%	N	%	N	%	N	%	N	%
Change of plant genes	63	40.4	58	37.2	23	14.7	9	5.8	3	1.9
Change of animal genes	68	43.6	54	34.6	24	15.4	9	5.8	1	0.6
Change of microorganisms' genes	59	37.8	44	28.2	30	19.2	21	13.5	2	1.3
Change of human genes	91	58.3	40	25.6	20	12.8	5	3.2	-	-
Parents' having children with features they like	87	55.8	36	23.1	23	14.7	8	5.1	2	1.3
Willingness to buy	Never agree		Disagree		Undecided		Agree		Absolutely agree	
	N	%	N	%	N	%	N	%	N	%
I eat potatoes with animal genes easily	93	59.6	36	23.1	19	12.2	6	3.8	2	1.3
I never eat cereals with bacteria genes	25	16.0	8	5.1	32	20.5	49	31.4	42	26.9
I consume corn with GMOs without concern	81	51.9	41	26.3	27	17.3	5	3.2	2	1.3
I prefer domatoes growing naturally to domatoes with GMOs	5	3.2	2	1.3	17	10.9	26	16.7	106	67.9
I easily drink cow milk with GMO bacteria	64	41.0	37	23.7	40	25.6	13	8.3	2	1.3
Behavioral purpose	Consume with ease		Consume		Undecided		Not consume		Never consume	
	N	%	N	%	N	%	N	%	N	%
If foods with GMOs are cheaper than the others	4	2.6	6	3.8	22	14.1	66	42.3	58	37.2
If foods with GMOs are in the same price as the others	2	1.3	2	1.3	23	14.7	63	40.4	66	42.3
If foods with GMOs are more expensive than the others	2	1.3	1	0.6	16	10.3	61	39.1	76	48.7
Usage	Absolutely against		Against		Undecided		Not against		Not absolutely against	
	N	%	N	%	N	%	N	%	N	%
Import of foods with GMOs	84	53.8	46	29.5	22	14.1	4	2.6	-	-
Import of foods supplemented with GMOs	83	53.2	46	29.5	22	14.1	4	2.6	1	0.6
Import of seeds with GMOs	86	55.1	42	26.9	20	12.8	6	3.8	2	1.3
Seeding of plants with GMOs	82	52.6	35	22.4	25	16.0	10	6.4	4	2.6
Raising animals with GMOs	86	55.1	37	23.7	26	16.7	5	3.2	2	1.3

The academic staff participated in the study stated that the change of plant (40.4%), animal (43.6%), microorganisms (37.8%) and human (55.8-58.3%) genes are very dangerous (Table 3). In addition, they stated that they wouldn't consume these products even if they were cheaper (42.3%), at the same price (42.3%) or more expensive (48.7%) than the other ones (Table 3). It was stated that these products wouldn't be consumed in the studies carried out in other countries as well [6, 17, 19, 21, 26]. 55.1% of the participants stated that they were absolutely against to the import of GMO seeds, 53.8% of them were against to the import of GMO products, 53.2% against to the import of food with GMO; 55.1% against to raising animals with GMOs and 52.6% against to seeding plants with GMOs (Table 3). While similar studies support our results [6, 14-15, 19, 21], some studies have identified a positive point of view [25].

In conclusion, it has been identified that the academic staff participated in this study have medium level of information about GMOs, they would never consume such food and want to be informed about the topic in detail. It has been observed that legal arrangements about GMOs require regular and effective supervision. Including true and reliable information in press will positively contribute to decrease the society's suspects about GMOs.

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