RESEARCH ARTICLE   **ARAŞTIRMA MAKALESİ**

The Sugar Consumption Tendencies of University Students: The Case of Tekirdağ Namık Kemal University

Üniversite Öğrencilerinin Şeker Tüketim Eğilimleri: Tekirdağ Namık Kemal Üniversitesi Örneği

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Abstract

The present study, having obtained data by applying face-to-face interview technique to 322 students at Namık Kemal University Faculty of Agriculture, reveals and analyses the tendencies of consumption of sugar produced from beet and starch-based sugar. In the framework of the research, some 60.9% of the students indicated that they consume sugar with their tea, 12.7% as chocolate, 12.1% as cake, pastry and biscuits etc., 5,6% as coke, 5% as fruit juice, and 3,7% as confectioneries. A large part of the students acquire sugar from the markets. Most of the students stated that the price of sugar was normal, the source of sugar which they consumed was sugar beet and 63.4% of them stated that they did not hear about starch-based sugar (SBS). It has been found out that 70.5% of the students consumed sugar as crystal sugar, 83.2% preferred to consume sugar every day, and when purchasing the sugar they mostly regarded the quality and brand of the product.

Keywords: Sugar produced from beet, starch-based sugar, consumption tendencies, consumer preferences

Öz

Namık Kemal Üniversitesi Ziraat Fakültesinde eğitim gören 322 öğrenci ile yüzyüze görüşme tekniği uygulanarak elde edilen verilerin kullanıldığı araştırmada, öğrencilerin pancar şekeri ve nişasta bazlı şeker tüketim eğilimleri incelenmiştir. Araştırmada, öğrencilerin %60,9'u şekeri en fazla çay şekeri, %12,7'si çikolata, %12,1'i kek, pasta ve bisküvi vb., %5,6'sı kola, %5'i meyve suyu, %3,7'si ise şekerleme olarak tükettiklerini belirtmişlerdir. Öğrencilerin büyük bir bölümü şekeri marketlerden temin etmektedir. Öğrencilerin büyük bir kısmı, şeker fiyatının normal olduğunu, tükettikleri şekerin kaynağının şekerpancarı olduğunu ve %63,4'ü Nişasta bazlı şekeri (NBŞ) duymadıklarını belirtmişlerdir. Öğrencilerin %70,5'i şekeri kristal toz şeker olarak tükettiği, % 83,2'si şekeri her gün tüketmeyi tercih ettiği, şeker satın alınırken ise en fazla ürünün kalitesine ve markasına dikkat ettiği sonucuna ulaşılmıştır.

Anahtar Kelimeler: Pancar şekeri, nişasta bazlı şeker, tüketim eğilimleri, tüketici tercihleri

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In Turkey, the main raw material of sugar is sugar beet. Starch-based sugars (SBS) consist of glucose, isoglucose, fructose, and its derivatives produced through various chemical methods from starch-based raw material such as corn, wheat, or potato, aside from saccharose, which is produced from sugar beet and sugar cane. Starch-based sugars are not consumed directly, but are mostly used as an input in sugary products. The main area of use of these sweeteners are confectionery, sugary and flour products, ice cream, halva, jam, marmelade, alcoholic beverages and soft drinks. The enaction of the Sugar Law in 2001, led up to the privatization of the sugar sector and starch-based sweeteners. In Turkey, which is the most appropriate country for beet production with its 10% quota rate is supported by the increase-decrease authority through the decision taken in the direction of increase each year by the council of ministers. Permission for the production of SBS is limited to 2-3% in EU countries. In addition, consumption of SBS per capita in EU countries is 1.5 kg while in Turkey it is around 6 kg per capita. Consumption of SBS is increasing in Turkey gradually. It is extremely important to determine the nutrition tendencies of students, the regulation of their nutrition in adulthood, and the prevention of probable disorders depending on inappropriate nutrition. The aim of this study is to determine the level of knowledge and consumption patterns of beet sugar and starch-based sugars, which have recently changed, and to determine the consumption tendencies of students. Results, which will be obtained from this study, are important in terms of revealing the level of knowledge and habits of university students about nutrition with sugar.

Materials and Methods

Material

In this study, data obtained from students of Tekirdağ Namık Kemal University, Department of Agricultural Engineering were used as primary data. The secondary data used in this study were the national and overseas studies and projects carried out, and reports issued by the Turkish Statistical Institute, FAO, Ministry of Agriculture and Forestry.

Method
Sampling Method

In the field study of the determination of sugar consumption tendencies of the students, who are studying at the Faculty of Agriculture was calculated by using the proportional sample volume formula given below (McClave and Sincich, 2009). Proportional sampling is a method of sampling in which the investigator divides a finite population into subpopulations and then applies random sampling techniques to each subpopulation (Salkind, 2010). There are 1654 students at Tekirdağ Namık Kemal University, Faculty of Agriculture. In the formula, 90% confidence interval, 5% error share and p = q = 0.5 were taken to reach the maximum sample volume.

$$n= \frac{4*N*p*q}{4*p*q+d^2(N-1)}$$

n = volume of sample, N = volume of main mass (1654), p = (0.5), q = 1-p, d = 0.05

As a result of the sampling, a face-to-face survey was conducted with 322 students who were randomly selected at Tekirdağ Namık Kemal University, Faculty of Agriculture. The data obtained from the questionnaire were coded into the statistical program and % (percent), frequency analysis, Friedman and Kruskal Wallis test were applied. The obtained data on the findings were presented in tables.

Results and Discussion

A total of 322 student questionnaires were administered at Tekirdağ Namık Kemal University, Faculty of Agriculture. According to the survey results, various findings about sugar consumption were determined. The findings obtained were revealed in detail in the following tables. It was found out that 70.5% of university students used sugar as crystal granulated sugar, 26.1% as crystal cube sugar, 1.2% as brown granulated sugar and the rest as dark brown cube sugar, and as liquid sugar (Table 1).

Table 1. Preferences of sugar consumption of students

| Kind of Sugar	Frequency	Ratio (%)
Crystal Granulated Sugar	227	70.5
Brown Granulated Sugar	4	1.2
Crystal Cube Sugar	84	26.1
Brown Cube Sugar	4	1.2
Liquid Sugar	3	1.0

When students were asked about the frequency of consumption of sugar, 84.2% of the students participated in the survey stated to consume it every day, 6.9% of them 3-6 days a week, 6.3% of the students 1-3 days a week, 2.3% of them 2 weeks a month, and 0.3% of the students stated to consume it 3weeks a month. When the average monthly consumption of sugar was taken into consideration, it was found out that 24.5% of the students had a weight of 1-2 kg, 22% had 500-1000 gr, 20.2% had 100-500 gr, 15.8% had 2-4 kg, 11.5% 4-6 kg of sugar consumption, and 5.9% of them consumed it in other quantities (Table 2).

Table 2. Monthly sugar consumption average of students

Monthly sugar consumption (average)	Frequency	Ratio (%)
100-500 gr.	65	20.2
500-1000 gr.	71	22.0
1-2 kg.	79	24.5
2-4 kg.	51	15.8
4-6 kg.	37	11.5
Other	19	5.9

It was found out that the most preferred sugar brandmark was Balküpü. Of the students, 11.5% preferred Doğuş, 11.2% of them preferred BIM granulated sugar, 6.5% of them preferred Ülker-Gökkuşağı, 1.2% of them preferred Migros granulated sugar, and 23.3% of them preferred other brandmarks. 87% of the students stated that the source of the sugar they consumed was sugar beet, 6% of them stated that it was corn, 4.3% stated that it was sweeteners, and 2.7% of them stated that it was sugar cane. 60.5% of the students stated that using sweeteners instead of sugar was harmful to health, and 39.5% of them stated that they were not harmful.

69.9% of the students stated that they found sugar prices normal and 21.5% found it expensive (Figure 1). In response to the question "Do you know the sugar prices abroad?" 95.7% of them answered "No".
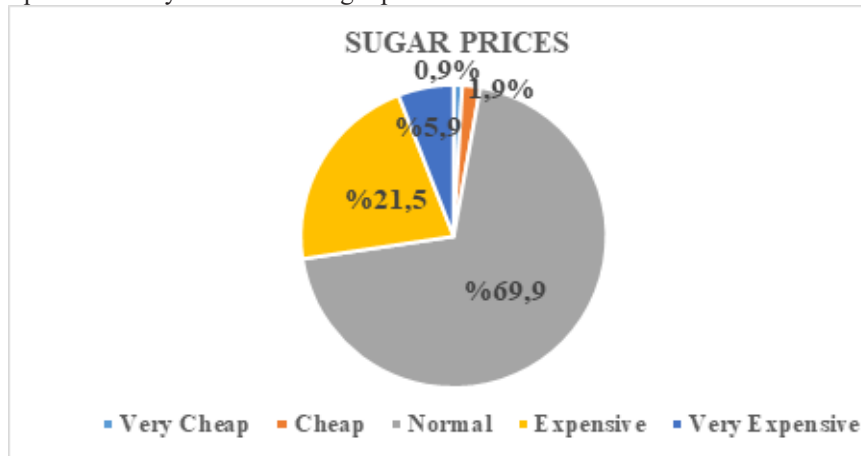
Figure 1. Opinions about sugar prices

63.4% of the students stated that they heard about starch-based sugar and 36.6% said they did not (Figure 2). 66% of the students who heard about starch-based sugar stated that they knew where the SBS was used and 34% stated that they did not know. 84.7% of the students stated that they did not prefer using starch-based sugar and 15.3% of them stated that they preferred it.
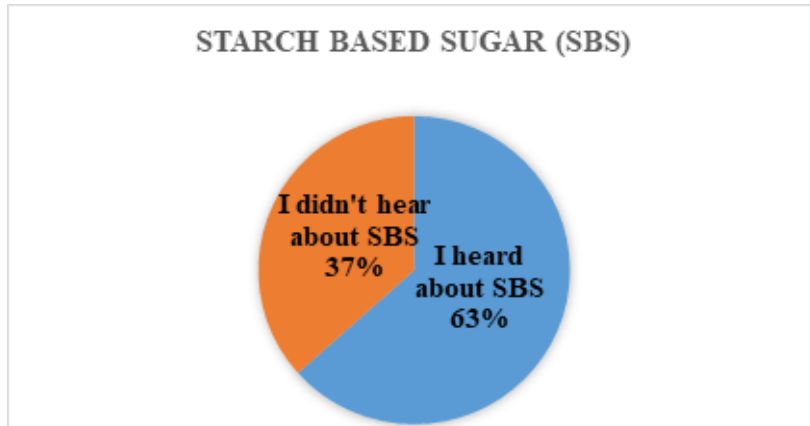
STARCH BASED SUGAR (SBS)

I didn't hear
about SBS
37%

I heard
about SBS
63%

Figure 2. Students' knowledge about starch-based sugar

With 80.1%, a substantial part of the students stated that they provided sugar from supermarkets. 11.3% of them stated that they bought it from grocer's, 6.8% from wholesalers, and 1.8% from the local district markets. Of the students, 32.6% bought it from BIM supermarket, 23.9% of them from A101 supermarket, 18.6% of them from Carrefour supermarket, 11.8% of them from Migros supermarket, 8.8% of them from Gökkuşağı süpermarket, 3% of them from Diasa supermarket, and 1.3% of them stated that they bought it from other supermarkets. While 35.7% of the students stated that they pay attention to the quality when purchasing sugar, 30.1% of the students pay attention to the brand, 25.8% of them to the price, 5.9% of them pay attention to the expiry date and 2.5% of the students pay attention to the packaging. While 62% of the students stated that the prices did not affect their sugar consumption, 48% of them stated that prices affected their consumption. When asked to indicate how their sugar consumption changed within the last three years, 60.6% of consumers have stated that there was no change, 21.5% stated that it increased, while 17.9% of them stated that it decreased (Figure 3).
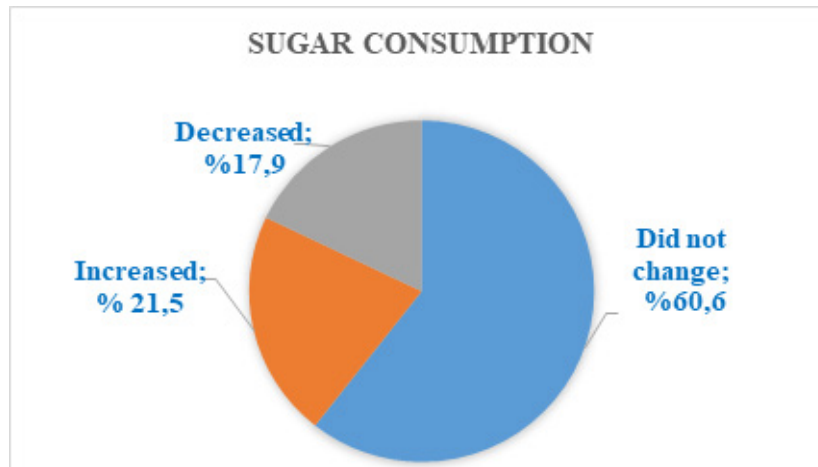
SUGAR CONSUMPTION

Decreased;
%17,9

Increased;
% 21,5

Did not
change;
%60,6

Figure 3. The change in sugar consumption within 3 years

Of the students, 60.9% stated that they mainly consumed sugar within tea, 12.7% of them as chocolate, 12.1% of them as cake, pastry, and biscuits, 5.6% of them within coke, 5% of them as fruit juice, and 3.7% of them stated that they mainly consumed it as confectionery (Table 3).

Table 3. Sugar consumption preferences of students

Sugar consumption preference	Frequency	Ratio (%)
Within tea	196	60.9
Chocolate	41	12.7
Cake, pastry, biscuits, etc.	39	12.1
Coke	18	5.6
Fruit juice	16	5.0
Confectionery	12	3.7

When asked the question "Where do you prefer sweet consumption?", 68.4% of them stated that they preferred to consume it at home. 21.2% of them at patisseries, 6.3% of the students at neighbor' and friend's house, 1% of them at restaurants and 3.1% of the students stated that they preferred to consume it at other places.

75.5% of the students stated that they have not heard about liquid sugar before. 64.7% of the students who have heard about it stated that they did not know where it was used, and 35.3% of them stated that they knew where it was used. 78.2% of the students stated that they would prefer not to use liquid sugar, and 21.8% stated that they would prefer to use liquid sugar. As a response to the question 'Has there been a change in the taste of the sugary food and fizzy drinks you consumed within 5 years?', 66.5% of the students replied as 'No', while 33.5% of them replied as 'Yes'.

51% of the students stated that sugar and sugary products were not produced in accordance with food safety and 49%of them stated that the products were produced accordingly.

85.7% of the students stated that they paid attention to the production date of sugar products, while 14.3% of them did not, 51.9% stated that they paid attention to the expiration date, while 48.1% of them did not; 57.5% of them stated that they read the "Contents" section of sugar products while 42.5% of them did not; 77.6% of them said that the "Producing Company" of sugar products was important for them, while 22.4% of them stated that it was not; 57.1% stated that they applied for "Consumer Rights" when they had a problem with sugar products while 42.9% said that they did not.

66.8% of the students stated that sugar factories should not be privatized while 33.2% of them stated that they should.

In chocolate consumption, 25% of the students preferred "Ülker" with 25%, "Nestle" with 18.1%, "Milka" with 16.5%, "Eti" with 14.3%, "Toblerone" with 9.7%, "Şölen" with 3%, patissery-made chocolate with 2%, and other brands with 11.4%. 42.3% of these students stated the reason for choosing the mentioned brand for its taste, 38.6% for its brand reliability, 9.7% for its quality, 8.4% for its price, and 1% for its advertisement. In chocolate consumption, 32.6% of the students preferred "milky chocolate" for its taste while 22.4% preferred "pistacchio chocolate", 21.8% preferred "hazelnut chocolate", 17.7% preferred "bitter chocolate", 2% preferred "wafered chocolate", 1.1% preferred "almond chocolate", 0.9% preferred "chocolate crackles", and 1.5% preferred other types of chocolates.

In fizzy drink consumption, 55.4% of the students stated that they consumed "coke", 12.4% of them preferred "soda pops" 11.8% preferred "fruit flavoured soda", 11.5% preferred "simple soda pop", 3.4% preferred "soda", 3.1% preferred "energy drinks", and 2.4% stated that they preferred other beverages.

In consumption of fizzy drinks, 47.8% of the students stated that they preferred "Coca Cola" while 12.4% of them preferred "Pepsi", 10.2% of them preferred "Fanta", 8.1% of them preferred "Çamlıca soda pop", 5% preferred "soda", and 16.5% of the students stated that they preferred other beverages. 52.9% of the students stated that the reasons for choosing the mentioned brand was taste, while for 34.3% of them it was the brand reliability, for 5.9% it was advertising, for 5.6% of them it was the price, and for 1.3% there were other reasons.

In fruit juice consumption of 67.9% out of all students, 100% stated that they preferred "fruit juice", 21.6% of them preferred "fruit nectar", 9.8% preferred "50% fruit juice", and the rest stated that they preferred other kinds of beverages. In fruit juice consumption, 25.8% of the students stated that they preferred "Cappy" as trademark, 24.2% preferred "Tamek", 12.4% of them preferred "Aroma", 11.5% preferred "Ülker", 9.6% of them preferred "Meyöz", 7.1% preferred "Pınar", 5.6% preferred "Dimes", and 3.8% stated that they preferred other brands. 54.7% of the students stated that the reason for choosing the mentioned brand was its taste, for 36.4% it was the brand liability, for 7.5% it was the price, and for 1.4% it was other reasons. 62.9% of the students said that in fruit juice consumption, they preferred "pure fruit juice" while 33.4% of them preferred "mixed fruit juice", and 3.7% of them preferred other types of fruit juice.

In biscuit-cake consumption, it was determined that 52.4% of the students preferred the brand "Ülker", 38.2% preferred "Eti", 6.2% of them preferred "patissery-made products", 2.2% preferred "Saray", and 1% stated that they preferred other brands. 53.2% of the students stated that the reason for choosing the mentioned brand was taste, for 42.9% it was brand reliability, for 3.2% of them it was the price and for 0.7% the reason there were other reasons. In the consumption of biscuit-cake, 30.1% of the students stated that they preferred them with "Cacao", 23.4% "Mixed", 20.9% of them with "Grape", 11% of them preferred them "Plain", 6.5% of the with "Orange peel", 5.9% of them with "Lemon peel" and 2.2% of the student stated that they prferred these products with other flavours.

In order to be able to learn about the point of view of university students to the role of the government at sugar consumption, they were asked "How should the government play a role in the consumption of sugar?", and were asked to give a number from 1 to 5.

The answers were categorized as

1. Not significant

2. Subordinatley significant

3. No idea

4. Significant

5. Very significant

The students were asked whether they would participate in 6 different opinions and their responses were given in Table 4.

Table 4. The viewpoint of the students to the role of government at sugar consumption

Opinions	Not Significant	Subordinatley Significant	No Idea	Significant	Very Significant
The government should reduce sugar prices	7.1	5.6	7.8	34.5	45.0
The government should encourage the use of SBS	50.4	26,6	6.8	8.4	7.8
The government should subsidise sugar production from sugar beet	3.4	4.7	5.2	29.2	57.5
The government should increase sugar quality of companies	1.2	2.8	4.3	28.9	62.8
The government should pay premium to producers of sugar beet	4.7	4.3	4.0	37.0	50.0
Governmental support should be excessive	0.9	4.0	5.0	28.8	65.3

The answer of half of the students to the opinion that "the govenrnment should pay premium to producers of sugar beet " was "very significant". Aside from sugar beet, students were asked to evaluate the opinion that "the governement should encourage the use of SBS", and the response of 50.4% was "not significant". The evaluation of 57.5% of the students was "very significant" to the opinion that "the government should subsidise sugar production from sugar beet". A great majority with 62.8% of the students evaluated the opinion "the government should increase sugar quality of companies" in the direction of "very significant". Students were asked to evaluate the opinion "The government should reduce sugar prices", and 45.0% of them responded as "very significant", and only 7.1% responded as "not significant". As the last opinion, students were asked to express their answer to the opinion "Governmental support should be excessive", and 65.3% of them replied as "very significant". These results revealed that most students thought that sugar production from sugar beets should be supported, companies should increase the quality of sugar, and support on sugar beet production should always be done by the government.

Friedman Test

The Friedman test is used to test whether there is a significant difference between distributions by comparing the distributions of two or more related variables. For this purpose, "Friedman Test" was used to test whether there was a significant difference between the factors affecting students' sugar consumption.

Table 5. The results of Friedman Test

Freidman Test	*Mean Rank*
Quality of sugar	10.81
Price of sugar	9.75
The source of sugar being sugar beet	10.50
Consumption of starch-based sugar	5.83
Sugar being coarse	7.11
Consumption of chocolate	9.51
Use of liquid sugar	5.78
Brand of sugar	10.74
Increase in the consumption of sugar on special days	9.06
Consumption of fizzy drinks	8.10
Package of product	8.70
Consumption of pastry, cake, and biscuits	9.82
The product being diet	6.37
Consumption of fruit juice	9.95
Advertisement of product	7.81
Governemental subsidy	9.98
Food Safety	13.18

As a result of the Friedman test, it was determined that there was a significant difference between the factors influencing students' sugar consumption (Asymp sig .0,000 <0,05). When Table 5 was analysed, it was determined that the determinant criteria, which became prominent in sugar consumption were food safety (13.18), sugar quality (10.81), brand of sugar (10.74), and the source of sugar being sugar beet (10.50).

Kruskal Wallis Test

The Kruskal-Wallis Test is used to determine whether there is a significant difference between the mean of two or more independent groups and a dependent variable. With this purpose, the Kruskal Wallis Test was conducted to determine the significance of the students' distinction in terms of sugar consumption according to monthly incomes, and the results were given

Table 6. The results of Kruskal Wallis Test.

	Kruskal Wallis Test				
	Monthly Income	N	Mean Rank	Test Statistics	
Sugar Consumption	0-499 TL	28	168.04	Chi square	4.416
	500-999 TL	113	151.77	df.	3
	1000-1499 TL	127	151.46	Asymp.Sig.	.220
	1500-1999 TL	31	143.41		
	Total	299			

As a result of the Kruskal Wallis test, it was found out that there was no difference between the average "monthly income" and "sugar consumption" (Asymp sig: 0.220> 0.05). When Table 6 was analysed, it was concluded that students who had the lowest monthly income (0-499) had a higher sensitivity to sugar consumption than the other income groups.

Conclusions

This study aimed to determine the knowledge levels of sugar consumption tendency and the knowledge levels of students at Tekirdağ Namık Kemal University Faculty of Agriculture.

According to the findings obtained from this study it was determined that the majority of the students consumed sugar every day and usually consumed it as crystal sugar. When the average monthly consumption of sugar was taken into consideration, it was found out that 24.5% of the students had a consumption of sugar as 1-2 kg, 22% of them had it as 500-1000 gr, 20.2% of the students had it as 100-500 gr, 15.8% of them had it as 2-4 kg, 11.5% of them had it as 4-6 kg, and 5.9% of the students consumed sugar in other quantities. According to the figures determined by WHO, sugar consumption should not exceed 25 gr. This indicates that the maximum monthly sugar consumption should be 750gr. From this point of view, it was found out that more than half of the students consume less than the above mentioned amount. It was concluded that students are sensitive and conscious about this issue.

60.5% of the students stated that using sweetener instead of sugar was harmful to health, and 39.5% stated that it was not. They emphasized that the sugar, which students consume, should be obtained from sugar beets, because they stated that it is extremely important for health.

Approximately 70% of the students stated that the sugar prices were normal, and 96% of them said they did not know about the overseas sugar prices.

A large majority of students stated that they heard about starch based sugar (SBS) but did not know where it was used. They also stated that they heard that starch-based sugar is harmful to health and that therefore about 85% of them prefer not to use starch-based sugar.

35.7% of the students stated that they were paying attention to quality when purchasing sugar, 30.1% to brand, 25.8% to its price, 5.9% to the expiry date and 2.5% to packaging. For the students, quality and brand of sugar were important. Sugar prices did not affect students' consumption any less. While 62% of the students stated that the price did not affect their sugar consumption, 48% of them stated that it did. It was found out that more than half of the students used sugar within their tea.

It was found out that 85.7% of the students paid attention to the production date of sugar products, 51.9% paid attention to the expiry date, 57.5% read the "Contents" section of the sugar products, 77.6% of them stated that the "producing Company" was important for them, 57.1% stated that they applied to "Consumer Rights" when they had a problem with sugar products. Within this context, it is obvious that students are sensitive and conscious about these issues.

Nearly 70% of the students stated that sugar factories should not be privatized. The reasons for that were the increase in the price of sugar, decrease in the production of sugar beet, the increase in SBS sector, and the suffer beet producers will face.

Approximately 90% of the students stated that sugar beet producers should be given premiums and sugar beet production should be subsidised. Approximately 95% of the students stated that the companies should increase their sugar qualities and that state support should absolutely be given.

As a result of "Friedman Test", which was made to test whether there is a meaningful difference between the factors affecting students' sugar consumption; it was striking that among the factors that effected students' sugar consumption were food safety, quality of sugar, brand of sugar, sugar beet being the source of sugar.

The relationship between students' sugar consumption and their monthly incomes was subjected to statistical analysis. For the students in the low income group, it was statistically determined that the effective factor was the price.

In conclusion, it was determined that university students were conscious about the consumption of sugar, agreed on the consumption of sugar produced from sugar beet and it was also determined that they knew that starch-based sugar is harmful to health, but only 66% of them had knowledge about the area of use of SBS. The reduction of SBS consumption has a strategic importance in terms of protecting the health of the students. Therefore, it is necessary to increase the level of knowledge and awareness of students about beet sugar, SBS consumption and its effects through visual media and written sources. In terms of health and nutrition of the community, measures should be taken to reduce the SBS quota. In addition, consumed products must include expressions such as "contains glucose syrup" or "produced from sugar beet".

Increasing the awareness of university students on healthy nutrition and especially sugar consumption is very important. There are few studies have being done on sugar consumption for students in universities. For this reason, this study will illuminate to the researches conducted in other universities. Researchs and projects being done on this subject should be supported.

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