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Assessment of the hidden threat of excessive salt into the body due to the use of bakery products in Uzbekistan

M.X. Mahmudova

Tashkent State Dental Institute

A.S. Hudayberganov

Center for the development of professional skills of medical workers of the ministry of health, M.D., professor

Corresponding author email: anatoliuhud@mail.ru

R.Sh. Baratova

Samarkand State Medical University, Senior teacher

R.Y. Xodjiaxmatova

Andijan Medical Institute. Department of General Hygiene

B.B. Musaev

The State University of Physical Culture and Sports of Uzbekistan

Abstract---An assessment of the actual consumption of bakery products among the adult population of Uzbekistan shows their significant amount in the average daily diet (in the city - 635 g, in rural areas - 685 g per 1 person). It was revealed that the content of table salt in bakery products varies in the range from 1 to 2.8 g per 100 g of the product. The absence of criteria for the norms of salt content in bakery products contributes to its excessive intake into the body (in a latent form), which for the urban population is 13.2 ± 1.0 g and for the rural population - 13.7 ± 1.0 g per day. The results of the conducted studies show the convincing need for rationing the content of table salt in bakery products as safety criteria for the health of consumers.

Keywords---actual consumption, noncommunicable diseases, alimentary sodium, kidneys.

Introduction

In the second half of the 20th century, there were significant changes in the structure of diseases all over the world. In addition to marked improvements in life expectancy, this period is characterized by profound changes in diet and lifestyle, which in turn contributed to the epidemic of noncommunicable diseases. Of all noncommunicable diseases, cardiovascular disease (CVD) is the main contributor to the global burden of disease. The “lagging” effect of CVD risk factors means that current mortality rates are due to past exposure to behavioral risk factors such as poor diet, including excessive salt intake, physical inactivity, and significant tobacco use [2].

An excess of alimentary sodium is a much more common situation than its deficiency - it is typical for the nutrition of the majority of the population in developed countries. As a result of a prolonged excess of sodium in the diet, hypervolemia, arterial hypertension develops, and kidney function is impaired. An excess of sodium in the diet also leads to calcium loss with urine: every 2.3 g of sodium excreted by the kidneys is accompanied by a loss of 24-40 mg of calcium. The need for sodium exists, but it is small - about 1 gram per day. It basically satisfies herself with a regular diet without the addition of table salt (0.8 grams per day). At the same time, a direct relationship has been established between the amount of excess sodium intake and hypertension. The ability of tissues to retain water is also associated with the sodium content. Therefore, excessive consumption of salt overloads the kidneys (when urine is formed, they process blood with a high sodium content) and the heart. As a result, the legs and face swell.

High blood pressure is a major risk factor for coronary heart disease and both types of stroke (ischemic and hemorrhagic). Daily sodium intake is the most studied in the diet of the many risk factors associated with high blood pressure. This issue has been studied extensively in experimental models, in epidemiological studies, in increasing scale studies and in population studies observed in restricted sodium intake [4, 5]. All of these data strongly suggest that sodium intake is directly related to blood pressure. A review of observational data from population studies suggests that a difference in sodium intake of 100 mols per day is associated with an average difference in systolic blood pressure of 5 mm. Hg at the age of 15-19 years and 10 mm. Hg. at the age of 60-69 years[5]. Diastolic blood pressure decreases by about half, but the relationship increases with age and the amount of initial blood pressure. An overall reduction in dietary sodium of 50 mols per day is estimated to result in 50% reduction in the number of people requiring antihypertensive treatment, 22% reduction in stroke deaths, and 16% reduction in coronary heart disease deaths [6]. In a study conducted in 2016 in Uzbekistan at the initiative of WHO, it was found [7] that the standardized consumption coefficient for the solidary age group of 18-64 years was on average 14.9 ± 3.5 g per day, which is more than 2 .5 times recommended by WHO adult salt intake limit of 5 g per day (<2 g sodium per day) (WHO, 2012) One of the main food products consumed daily by the population of Uzbekistan is bakery products. However, due to the lack of rationing of the content of table salt in bakery products, these products can be a source of a hidden threat in relation to table salt.

The purpose of the research was to assess the threat of excessive sodium consumption by the population of Uzbekistan at the expense of bakery products.

Materials and research methods

The state of actual consumption of bakery products among the population was studied according to generally accepted and approved hygienic and statistical methods [8]. The material for statistical analysis was the data of a questionnaire survey of 1700 people living in different regions of the country, and the data from laboratory studies on the content of table salt (State standards 5698) [9]. To eliminate calcium interference, the atomic absorption method according to I.M. Skurikhin was used [10].

Despite the well-known risk factors in the development of cardiovascular diseases, one of which is excessive consumption of table salt, studies on its content in the diets of the population of Uzbekistan have not been previously conducted. In connection with the peculiarities of nutrition of the population of the republic, we have studied the average daily consumption of bakery products and the content of table salt in them.

Results of the study and their discussion

The analysis of data on the average daily consumption of various types of bakery products among urban and rural residents shows the widespread predominant consumption of national types of bakery products and a relatively low consumption of shaped wheat and rye bread among the rural population compared to the urban population (Table 1).

Table 1
Average daily consumption of bakery products among the urban and rural population, g/day, $M \pm m$

№	Name of bakery products	Urban population		Rural population		P
		M	$\pm m$	M	$\pm m$	
1.	Shaped bread from 1g wheat flour	90	20,0	80	10,0	-
2.	Shaped bread from premium wheat flour	70	10,0	20	5,0	<0,001
3.	Shaped bread made from rye flour	35	5,0	10	2,0	<0,001
4.	Bread made from rye and a mixture of rye and wheat flour of 1g	25	3,0	10	3,0	<0,001
5.	Butter buns from wheat flour of 1g	10	5,0	15	2,0	
6.	Butter buns from premium wheat flour	15	5,0	10	2,0	
7.	Buns with bran	10	3,0	-	-	
8.	National, industrial	80	10,0	50	10,0	<0,05

	flatbread					
9.	National, home-made flatbread from flour of 1g	120	10,0	250	20,0	<0,001
10.	National,home-made flatbread "Fatir-non"	80	20,0	70	10,0	-
11.	National,home-made flatbread "Obi-non"	50	10,0	50	5,0	
12.	National,home-made flatbread "Piyozli-non"	50	5,0	120	10,0	<0,001
Total:		635	15,0	685	20,0	<0,05

It is determined that the total average daily amount of bakery products, consumed by the urban population is less and amounts to 635 ± 15.0 g, and residents of rural areas - 685 ± 20.0 g ($P < 0.05$). Of the total amount of average daily bakery products consumed, national types of home-made products account for 300 g or 47.2% among the urban population, and 490 g or 71.5% among the rural population. Whereas bakery products of industrial production consume 335 g per person per day in the city, or 52.7%, and in the regions - 195 g, or 28.5%. It was determined that home-made bakery products, rural residents consume 2.5 times more than industrial production ($P < 0.001$), and the urban population almost equally consumes home-made bakery products (47.2%) and in production (52.7%). Consequently, compared with the urban population, the diet of rural residents contains 1.6 times more home-made bakery products of national types (490 vs. 300 g, $P < 0.001$).

According to the research results, the salt content in bakery products varies over a wide range (Table 2). The established fluctuations are explained by the fact that the content of table salt in the standards for bakery products is not regulated. Existing recipes for industrial bakery products provide for the arbitrary addition of table salt (to taste) in an average volume of 1 to 1.5% for wheat flour bakery products and 2.5 to 3% for rye flour. A significant amount of consumed national types of bakery products is produced in households according to individual recipes. From the data in Table 2, it follows that the content of table salt in bakery products of industrial production is 1.2 times less and averages 1.86 g, while in home-made products it is 2.28 g per 100 g of product.

Table 2
Salt content in the main types of bakery products,
in g per 100 g of product, $M \pm m$

№	Name of bakery products	Table salt content, (g per 100 g product)	
		M	$\pm m$
1.	Shaped bread from 1g wheat flour	1,7	0,2
2.	Shaped bread from premium wheat flour	1,4	0,2
3.	Shaped bread made from rye flour	2,8	0,3
4.	Bread made from rye and a mixture of rye and	2,1	0,3

	wheat flour of 1g		
5.	Butter buns from wheat flour of 1g	1,1	0,2
6.	Butter buns from premium wheat flour	1,0	0,2
7.	Buns with bran	2,6	0,3
8.	National, industrial flatbread	2,2	0,3
9.	National, home-made flatbread from flour of 1g	2,4	0,3
10.	National, home-made flatbread "Fatir-non"	2,3	0,3
11.	National, home-made flatbread "Obi-non"	2,3	0,3
12.	National, home-made flatbread "Piyozli-non"	2,1	0,3

The results of the data on the average daily intake of table salt in the body, due to the consumption of bakery products, are presented in table 3. An analysis of the tabular data shows that an average of 6.3 g of table salt per day enters the body of urban residents, due to the consumption of industrial bakery products, and 6.9 g - due to home-made products; the rural population, respectively, 2.5 and 11.8 g per day.

An analysis of the tabular data shows that an average of 6.3 g of table salt per day enters the body of urban residents, due to the consumption of industrial bakery products, and 6.9 g - due to home-made products; the rural population, respectively, 2.5 and 11.8 g per day.

Table 3
The average daily intake of salt in the body through the consumption of bakery products, g/day, $M \pm m$

№	Name of bakery products	Urban population		Rural population		P
		M	$\pm m$	M	$\pm m$	
1.	Shaped bread from 1g wheat flour	1,53	0,001	1,36	0,001	<0,001
2.	Shaped bread from premium wheat flour	0,98	0,001	0,28	0,001	<0,001
3.	Shaped bread made from rye flour	0,98	0,001	0,28	0,001	<0,001
4.	Bread made from rye and a mixture of rye and wheat flour of 1g	0,52	0,001	0,21	0,001	<0,001
5.	Butter buns from wheat flour of 1g	0,11	0,001	0,16	0,001	<0,001
6.	Butter buns from premium wheat flour	0,15	0,001	0,1	0,001	<0,001
7.	Buns with bran	0,26	0,001	-	-	-
8.	National, industrial flatbread	1,76	0,001	0,11	0,001	<0,001
9.	National, home-made flatbread from flour of 1g	2,88	0,001	6,0	0,01	<0,001
10.	National, home-made flatbread "Fatir-non"	1,84	0,001	1,61	0,001	<0,001
11.	National, home-made flatbread "Obi-non"	1,15	0,001	1,15	0,001	<0,001
12.	National, home-made flatbread	1,05	0,001	2,52	0,001	<0,001

	"Piyoqli-non"					
Total:		13,2	1,0	13,7	1,0	-

Conclusions

1. An assessment of the actual consumption of bakery products among the adult population shows their significant amount in the average daily diet, which in the city is 635 ± 15.0 g and in rural areas 685 ± 20.0 g per 1 person.
2. Rural residents consume national types of bakery products made at home to a much greater extent, while industrial products are consumed by them 2.5 times less (490 vs 195 g).
3. The lack of standards for limiting salt in bakery products contributes to its excessive intake into the body (in a latent form), which for the urban population is 13.2 ± 1.0 g and for the rural population - 13.7 ± 1.0 g per day.
4. The results of the present studies show a compelling need for rationing the salt content in bakery products as safety criteria for consumer health.

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