



RESEARCH ARTICLE

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HYGIENIC ASSESSMENT OF RESIDUAL AMOUNTS OF CHEMICAL SUBSTANCES IN MILK AND DAIRY PRODUCTS IN A DAILY DIET OF NUTRITION OF THE POPULATION OF THE FERGANA VALLEY

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ABSTRACT

This article examines the residual amounts of chemicals in the composition of milk and dairy products in the daily diet of the population. The chemical substances studied residual amounts of salts of heavy metals, like lead, mercury, cadmium, copper, also nitrates and nitrites, mycotoxins. The study was conducted using hygienic, chemical, instrumental and statistical methods for the study of milk and dairy products produced by dairy enterprises and private farms in the Fergana, Namangan and Andijan regions.

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INTRODUCTION

During the years of independence in our country, the health care sector has been radically updated, wide-ranging program activities are being carried out, including research on the prevention, early detection, diagnosis and treatment of diseases associated with malnutrition. Scientists from around the world study problems of quality and food safety. In this direction, WHO has developed a global strategy to provide the population with safe food, reduce morbidity and develop social conditions (Geneva, WHO, 2002). In Uzbekistan, problems of actual nutrition were studied, deficiencies in the diet of proteins, fats, carbohydrates, vitamins and micro-elements were determined, various diseases (anemia, hepatitis, ischemic heart disease, etc.) related to nutrition were studied and rational principles were developed. Nutrition of various groups of the population [1]. However, the problem of the hygienic significance of milk and dairy products remains a number of unresolved issues, such as determining the actual use of milk depending on the season of the year, gender and age, family income. The hygienic conditions for the production of milk and dairy products, peculiarities of the technological process

leading to contamination of milk and dairy products have not been studied, the total contamination of milk and dairy products with foreign substances has not been studied sufficiently, methodological recommendations on quality control and safety of milk and dairy products have not been developed. The content of hazardous substances in milk and dairy products, which include heavy metals, pesticides, mycotoxins, nitrates, contributes to the growth of diseases associated with malnutrition. The intake of heavy metals in the composition of milk is explained by the use of obsolete dishes, instruments and equipment, as well as by the flow from the external environment [2].

The aim: assessment and justification of the hygienic parameters of quality and safety of finished dairy products.

MATERIALS AND METHODS

The object of the study was milk produced by dairy enterprises and private farmers in the Fergana, Namangan and Andijan regions. A total of 1212 studies were conducted. To solve these problems, hygienic, chemical, instrumental and statistical research methods were used.

Safety assessment of milk and dairy products was carried out by the following methods: GOST 26932-86 "Raw materials and finished products." Lead determination method; GOST 26935-86 "Raw materials and finished products." Method for the determination of tin; GOST 26927-86 "Raw materials and finished products." Method for the determination of mercury; GOST 26931-86 "Raw materials and finished products." Method for the determination of copper; State standard 29934-86 "Raw and finished products." Method for the determination of zinc. Of mycotoxins, aflatoxin M1 was determined by thin layer chromatography and evaluated according to MU No. 4082-86. For the determination of nitrates, the recommendations of VPSayapina *et al.* [3] were used. Statistical processing of quantitative data was carried out using the EXCEL software package on a Pentium-4 computer. The mean statistical value of the indicators (M), the standard deviation (δ), series error (m), Student's criterion (t), with the calculation of the error probability were determined (P) *et al.* Differences were considered significant at $P < 0.05$.

Study and discussion of results: The analysis of milk and dairy products consumed by the population of the oblasts of the Fergana Valley indicates the presence of chemical xenobiotics in their composition that pose a potential health hazard. Comparative characteristics of the content of salts of heavy metals in the milk of different territories shows that we have not revealed any significant differences in indicators by regions. The appearance of heavy metal salts in milk is explained by its transport in containers made of tin, copper, and aluminum. Lead - as a heavy metal causes chronic poisoning. In the areas of the Fergana Valley observed by us, the average amount of lead was 0.195 ± 0.04 mg / kg. In the Andijan region, the lead content in the milk composition is 0.15 ± 0.02 mg / kg, in the Namangan region 0.22 ± 0.03 mg / kg, in the Fergana region 0.16 ± 0.009 mg / kg, in Fergana - 0.23 ± 0.02 mg / kg. Su-accurate intake of lead in the body with milk in the Andijan region is 0.005 mg, in the Namangan region - 0.007 mg, in the Fergana region - 0.006 mg, in the city of Fergana - 0.008 mg.

The mercury content in the milk composition in the Fergana Valley in the zones we observed is 0.0018 mg / kg, the daily dose is 0.0004 mg; the concentration of mercury in milk in Fergana city is 0.002 mg / kg, the daily dose is 0.0007 mg. The average amount of mercury in raw milk is 1.97 ± 0.03 mg / kg, the minimum is 0.155, the maximum- 3.15 mg / kg. The content of lead and mercury in kaymak, sour cream, suzme, kefir, yogurt and other sour - dairy products is trace. In Europe, there is no information about the potential danger of cadmium in the composition of milk. According to our data, the average content of cadmium in milk is 80.2 ± 5.1 mg / kg, the daily intake is 2.86 ± 0.18 mg, its maximum content in milk is 122.6 mg / kg, the minimum content - 4.87 mg / kg. The maximum daily intake is 4.37 mg, the minimum dose is 0.13 mg. Quantitative indicators of residual amounts of copper salts in the composition of dairy products indicate that in the daily ration the amount of copper was 0.45 ± 0.03 mg kg. The daily dose of copper entering the body was 0.016 ± 0.001 mg. At the observation points in the Andijan region, residues of copper salts in milk amounted to 0.45 ± 0.03 mg / kg, daily dose of 0.016 ± 0.001 mg. In the Namangan region, this indicator was 0.68 ± 0.06 mg / kg, the daily dose was 0.02 mg, at the control points in the Fergana region - 0.38 ± 0.02 mg kg, and the daily dose was 0.013 mg, in the city of Fergana - 0.45 ± 0.01 mg / kg, daily dose - 0.016 mg.

The highest indicator in the Fergana region was recorded in the city of Fergana - 0.9 mg kg, while the daily dose was 0.032 mg. It is known that, as a result of a reduction reaction, nitrates are converted into nitrites, which are hazardous to the body, since, being a toxic substance, they convert hemoglobin into methemoglobin. In the composition of the dairy products studied by us, the average amount of nitrates is 10.5 ± 1.1 mg kg. The daily dose delivered to the body is 0.37 ± 0.04 mg. It should be noted that these figures are significantly lower compared to nitrates, which we found in the composition of water and melon crops (in water 50 mg l, melons-90, ar-buzah - 90, beets - 1600 mg kg). However, if we take into account the constant use of a significant amount of water, the identified nitrate concentrations represent a potential hazard. The daily amount of nitrates in milk in the Andijan region was 8.4 ± 0.7 mg / kg, in the Namangan region 10.3 ± 0.7 mg / kg, in the Fergana region 9.8 ± 0.7 mg kg, in the city of Fergana 13.4 ± 1.04 mg kg. The maximum detected nitrate concentration was 26.4 mg / kg. In recent years, data on the possibility of aflatoxin contamination of maternal and cow's milk have appeared in the literature. These data were obtained as a result of research conducted on the territory of Kazakhstan. Our detection of mycotoxins in 2013–2015 in dynamics showed that in 2013 the number of mycotoxins in milk averaged 0.009 ± 0.0002 mg / kg, in 2014 - 0.0007 ± 0.0003 mg / kg, in 2015 0.0004 ± 0.00003 mg / kg, i.e. the amount of mycotoxins in the diet tends to decrease. Low concentrations of aflatoxin were found in dairy products of the Fergana Valley, however, their total intake with other products, synergistic features, and cumulative properties of aflatoxins can be a potential hazard to the general population. The study of foreign substances in the composition of dairy products in the diet of the population showed that dairy products contain chemical xenobiotics, which, with their total assessment, pose a potential risk to human health. The establishment of measures on dairy farms fully guarantees the quality and safety of dairy products from production to delivery to the consumer.

Conclusions

1. In the observation points of the Fergana Valley in the composition of milk and dairy products included in the diet, traces of heavy metals were detected, when assessing their total effect, the safety factor was 0.4, which is estimated as a safe level. The content of residual amounts of nitrates, antibiotics, mycotoxins in dairy products requires more control over the production of milk and milk products.
2. The conducted research allowed to identify priority critical points and hygienic parameters of continuous system control in the process of obtaining and ensuring the quality and safety of finished dairy products. As a result, the establishment of critical control points and systematic monitoring provided a change in the positive side for 20% of the quality and safety of dairy products.

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