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Assortment Dishes Analysis Provided for Children's Meals in Preschool Educational Organizations in Uzbekistan and Their Biological Maturity

Roza Kamilova[1,*], Laylo Basharova[2], Lola Isakova[3], Javlon Kamilov[4]

[1]Professor, Director, Research Institute of Sanitation, Hygiene and Occupational Diseases, Tashkent, Uzbekistan
[2]Postdoctoral Student, Research Institute of Sanitation, Hygiene and Occupational Diseases, Tashkent, Uzbekistan
[3]Senior Researcher, Research Institute of Sanitation, Hygiene and Occupational Diseases, Tashkent, Uzbekistan
[4]Teaching Assistant, Tashkent State Dental Institute, Tashkent, Uzbekistan

Abstract **Background.** The fullness and dietary diversity is particular importance in program implementation of ensuring a nutritious diet and biological maturity for children of pre-school age. **Objective:** to analyze food intakes and biological development of permanent teeth between children in preschool educational facilities in Uzbekistan. **Materials and methods.** Approximately 250 preschool educational organizations (PEOs) menus for 9-10.5 or 12 hours for children aged 3-6. Depending on staying time in preschool educational organizations, meals were served 3 times (control group), 4 times (2nd main group) and 5 times (1st main group). There were studied 975 children aged from 4 to 6 years and divided into two groups depending on meals frequency in PEOs. **Results and discussion.** The 3 meals a day PEOs had the richest dietary variety. The 4 and 5 meals a day PEOs had a strong pattern of frequent menus on a day and 10 days. For the 5 meals a day PEOs, there was a significantly higher frequency of food intake. It noted monotonous diet between preschool children's is a big problem all over the world, excluded commercial and homemade meal suppling in preschool educational organizations. The biological maturity index in children with three meals a day is more pronounced than in children with 4 and 5 meals a day. **Conclusion.** It identified a need for a review of existing menu strategies and for training programs aimed at promoting varied and healthy cooking techniques.

Keywords Assorted variety dishes, Dishes repeatability, Dietary diversity, Length time stay, Multiplicity of meals, Children 3-6 years old, Biological maturity, Preschool educational organizations

1. Introduction

Food supplying in organized groups of preschool children makes a significant contribution to the diet of growing child organism, and depending on the length time stay in preschool educational organizations (PEOs) makes from 50 to 60% of the recommended average daily ration [6,14,15,18]. In this regard, the food supply in preschool facilities in nutritious and rational way is a primary task of the sanitary service.

The correct food ration for a pre-school child should provide a diversity of foods that are rarely replicated during the 10-day meal. In PEOs, menus are prepared separately for the winter-spring and summer-autumn periods of the year and must take into account children's needs for basic nutrients and energy. The composition of prepared dishes should include meat, dairy and fish products, eggs, vegetables, fruits, berries, etc. [21].

The organization of diversified diet and variety food consumption ensures its completeness and adequate intake of essential nutrients. This principle plays an important role especially for children growing up [12,18,23,25,29].

Regulations, programs or recommendations for a balanced diet for organized children exist in different countries. Despite the good achievements, there are still some challenges: a monotonous diet, high intake of carbohydrates and fatty foods, reduced intake of fish and dairy products, fresh vegetables and fruit [1,8,15,16,22,29]. These facts negatively affect the health of children's organism [2,13,19].

Appropriate programs can be developed to improve the dietary intake of preschool children through regular surveillance and dietary audits in preschools [3,13,15].

The teething period of primary and permanent teeth is one of the criteria for assessing a child's biological maturity. Considering that children are the most sensitive to the influence of exogenous environmental factors, it is necessary to regularly analyze age- and gender-specific patterns and peculiarities of non-permanent and permanent teething

* Corresponding author:
rozakamilova@mail.ru (Roza Kamilova)
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sequence in children in order to manage children's health and early prevention of maturity disorders [26,28].

Considering the relevance of the problem, the objective of this study was to assess the actual consumption of an assortment of dishes by children attending preschool educational organizations in Uzbekistan, and biological maturity assessment by time of permanent teething sequence.

2. Materials and Methods

About 250 menus-sheets for children from 3 to 6 years of age, whose time in the PEOs was 9-10.5 or 12 hours, were examined. Depending on the length time stay in PEOs, meals were served 3 times (control group), 4 times (2nd main group) and 5 times (1st main group). In the surveyed PEOs, the 3-daily diet included breakfast, lunch and afternoon snack, the 4-daily diet additionally included dinner, and the 5-daily diet included a second breakfast and dinner. The examined children of the 1st main group received breakfast, second breakfast, lunch, afternoon snack and dinner in preschool facilities, and breakfast and second dinner at home; children of the 2nd main group received breakfast, lunch, afternoon snack and dinner in PEOs, and breakfast and second dinner at home. Daily reproduction of the actual food intake of children in the control group showed that on weekdays it consisted of 3 meals per day in the PEOs (breakfast, lunch, afternoon snack) and 2 meals at home (breakfast and dinner).

Children's teething timing was studied in order to study the influence of the frequency of meals in PEOs on their biological maturation. A total of 975 children aged from 4 years 6 months to 6 years 6 months were examined. All examined children were divided into two groups: a control group - children with three meals a day and a main group - children with 4 and 5 meals a day in PEOs.

Statistical data analysis was carried out using Statistica-6 and Microsoft Exsel-2016 computer programs. The values of mean (M), standard deviation (±SD), standard error (±m) and relative values (frequency, %) were calculated. Differences at $p \leq 0.05$ were considered statistically significant.

3. Results and Discussions

Analyzing the menus prepared for winter-spring and summer-autumn periods of the year, it was revealed that most of the dishes intended for children of the 1st main group, as a rule, were cooked in boiled form, but there were fried dishes in the diet, which are not recommended for children's organism.

For the first breakfast, children of the 1st main group were given bread, butter, milk porridge using semolina, millet, rice and barley cereals. Boiled eggs were included in the breakfast ration once every 10 days instead of porridge. Tea with sugar, sweet tea with milk or lemon was given for breakfast. In the 10-day menu for the second breakfast, the children in the first main group consumed cow's milk frequently, fresh fruit not more than twice as often, canned fruit juices and cottage cheese very rarely. Lunch consisted of a salad, one, two and three meals. There was also some wheat bread. Every day there were salads on the menu. Radishes and cabbage were the most common salads. Cucumbers and tomatoes without the added vegetable oil were found less frequently, only 1 or 2 times in a 10-day period. Meat or chicken broth soups were the first meal. They were usually served with pasta, rice, pearl grits and peas, less often with cabbage. Cooked or braised meat was served as a main dish, and fried meat was served less frequently (once every 10 days). The side dishes consisted of cereals and pasta. Vegetables, including potatoes, were less common. Compotes of apples or plums were served as a third course (1-2 times in 10 days). The children in the first main group were given milk to drink every day as a snack in the afternoon. It was found that over a 10-day period the frequency of omelets or cottage cheese puddings was twice, fried sausages or eggs once or twice, sweet pastries once and baked vegetables (mostly pumpkin) as an afternoon snack. The dinner menu usually consisted of soups made from meat or chicken broth, to which cereals and pasta were added. Roasts were eaten as a second meal every 10 days.

Milk soups with noodles and porridge made using semolina, millet, buckwheat and rice cereals were commonly eaten for breakfast by children in the second main group. They were given milk or tea with sugar and sandwiches with butter for breakfast only once in 10 days. Salads, wheat bread, first, second and third courses were included in the menu for lunches. salads usually included cucumbers, tomatoes and radish. Cooked beans were added no more often than once every 10 days and dressed with vegetable oil. Pasta, cereals and, less frequently, vegetable soups with meat and, less frequently, chicken broth were first at lunchtime. Dishes of boiled, stewed or fried meat were prepared for the second meal. Sides were rice, pasta, porridge, pearls or buckwheat grits. A steamed vegetable stew was sometimes served as the second meal. Beverages served once every 10 days were apple compote and, less frequently, plum compote. Dairy products, light carbohydrates (sweets, Uzbek somsa with pumpkin) were served after lunch. Dinner consisted of milk and meat soups with cereals, pasta and vegetables for 4 meals. Sweet tea was the only drink on the menu.

The 3-course meal consisted of breakfast, lunch and an afternoon snack. Breakfast was usually hot milk, and drinks were hot milk, sweet tea (rarely with lemon) or milk tea. Lunch consisted of salad, wheat bread and three courses. Salads consisted of all kinds of fresh vegetables according to the season (cucumbers, tomatoes, fresh cabbage or sauerkraut, radishes, carrots, beetroot). There was various assortment of meals included Uzbek national food (plov, shavlya, lagman, mash-kichiri) and drinks as compote, kisel, milk, kefir or sweet tea; and once every 10 days were included fruits. The after-lunch menu was quite rational for three-meal PEOs. It usually consisted a balance of proteins, fats and carbohydrates (omelets, pancakes, toast, cottage cheese pudding, casserole, pastries or biscuits and milk, yoghurt or cocoa).

The menu in most of the surviving PEOs was poor. There was a tendency to use the same products every day. The menu for the 3 meal day PEOs used more different types of dairy products, seasonal vegetables and fresh fruit.

The problem of monotonous menus in children attending organized groups is not only a current issue in Uzbekistan, but is also faced by other foreign countries, including the United States, Finland, Poland, New Zealand, the United Kingdom, Sweden and Australia. Thus, when analyzing the diet of children in the above countries, it was found that the diet of preschool children in almost all of the above countries is monotonous, low in fruit and vegetables, vegetable proteins and cereals [3,5,6,8,9,15,17,20,27].

However, a more favorable situation was observed in Finland, where the preschool diet accounted for 54% of daily energy intake and provided ≥60% of total fiber, polyunsaturated fatty acids and vitamins D and E. Preschoolers consumed more than 60% of fish meals, but only one third of daily fresh fruit intake and 60% exceeded salt intake of recommended guidelines [12].

In Poland, there was a positive effect of reducing consumption of sugar-sweetened drinks and increasing the amount of water by 23% [17].

In a nutritional assessment and menu evaluation of preschoolers in New Zealand, most menus did not meet current nutritional recommendations for quantity and variety [8].

In a study of food preferences among Italian preschool children based on the analysis of uneaten food, it was found that children preferred starch-based dishes with meat sauce and cheese, lean poultry, fried potatoes and fruit yoghurt, fresh seasonal fruit or fruit ice cream, while the least liked dishes included vegetable soup (with pasta or rice) or pasta with courgette or legumes, and seafood. Accordingly, the consumption of seafood, legumes and vegetables was in insufficient quantity [6].

A comparison of actual foods and drinks consumed by children in New York kindergartens with national dietary guidelines found that foods and drinks provided and consumed by children met >50% of the recommended dietary allowance for most nutrients. Intakes of fiber and vitamins D and E were 50% of the recommended average daily intake for whole grains, fruits, fruit juices and dairy products, but <50% of the recommended amount for whole grains, protein products and vegetables. Consumption of oils was below the norm for calories, but foods and drinks with solid fats and added sugars exceeded the norm by 68% [5]. Training of cookery staff, auditing and monitoring of actual nutrition and feedback from parents have been shown to be effective among the main mechanisms for improving nutritional security of children in preschool organisations [4,6,7,17,20].

In the present study, of the total number of children examined in the main group aged 4.5 years (101 children), none had permanent teeth. In contrast, three of the 98 control children of the same age had one permanent tooth each: central lower incisors (31 and 41 teeth, 1.03% each) and lower first molars (46 teeth, 1.01%). The average number of permanent teeth in the oral cavity of the lower jaw of the 4.5-year-old children studied, who ate 3 meals a day, was 0.03±0.02 units.

At age 5, 52.8% of the control group and 69.5% of the main group had no permanent teeth. Twenty-seven percent of children in the control group and the same number of children in the main group (26.2%) had one permanent tooth in their mouth, while 4.2% of children in the main group and 3.9 times as many children in the control group (15.6%) had two permanent teeth. Whereas 4.2 percent of the five-year -olds in the control group had three permanent teeth, none of the children in the main group had three permanent teeth.

The data presented shows no variation in the specific weight of eruptive dentition in children aged 5 years. According to the results of the study, if the average number of permanent teeth in the upper and lower jaw of children with 4 and 5 meals per day in PEOs at the age of 5 years was 0.35±0.06 units, the number of teeth of children in the control group (with 3 meals per day) was twice higher: 0.78±0.09 units ($P<0.01$). Children in the control group had significantly more teeth in both the upper and lower jaw than children in the main group ($P<0.05$). In addition, the increase in teeth between the ages of four and six months and five years were 1.94 times higher in the control group than in the main group, and 0.68 vs. 0.35 units for 6 months.

Given that dietary diversity, nutrient intake and nutritional status of preschool children affect their growth and development [3,24]. It is necessary for concerned stakeholders to assess the actual nutrition in preschool organizations in order to develop adequate measures to ensure the nutritional adequacy of children's bodies. In addition, health education on the benefits of a varied diet and ways to prepare nutritious meals, as well as the development of healthy eating habits among children, play an important role. Medical workers and pedagogical staff of childcare and educational facilities, as well as parents, are recommended to use the developed training programs, which reflect the basic principles of formation of nutrition culture in children and adolescents and development of preventive measures aimed at improving the health of children's bodies [10,11].

4. Conclusions

The 3-meal PEOs had the greatest variety of dishes, whereas the 4-meal and 5-meal PEOs had a high repetition of the same dishes for both one day and 10 consecutive days. The effect of three meals a day on the index of biological maturity is more pronounced in children than in children with four and five meals a day. The study identified the need to review existing menu strategies and develop training programs to promote varied and healthy cooking techniques for cafeteria staff, educators, parents and children.

Compliance with ethical standards. The study approved by the Local Ethical Council of the Research Institute of Sanitation, Hygiene and Occupational Diseases (Protocol of ethical review №6 from 09.07.2024). Before the beginning

of the research, explanatory work about the purpose and methods of the research conducted, then a voluntary written consent obtained from each parents (legal representatives).

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