Research Article

Nutrition characteristics and morbidity of adolescents (15-17 years) of Kyrgyz Republic

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Abstract

Objective: In this study, we analyzed the nutrition status and morbidity of adolescents.
Methods: The data for the current study were obtained from the database of National statistical committee of Kyrgyz Republic for the period of 2009-2014 on nutritional and energy value of nutrition of urban and rural population living in conditions of high-, middle- and low-altitudes. We compared obtained data with current recommended norms of consumption for food ingredients, energy and food products.
Results: Among adolescents of Kyrgyz Republic, residing especially in rural and high-altitude regions, there is an excessive consumption of fat and carbohydrates, and reduced consumption of protein. There is an increasing trend in prevalence of cardiovascular, respiratory, gastrointestinal and endocrine disorders, as well as malignancy for the period 2010-2014.
Conclusion: The nutrition of adolescents is unbalanced and unhealthy, with diet composed mostly of carbohydrates and fat, lacking proteins and fruit and vegetables, accompanied by increased trend of morbidity, especially in rural and high-altitude regions. There is a need for interventions directed to both decrease poverty levels and increase awareness of healthy nutrition among adolescents and their families.

Key words: adolescents, nutrition, risk, malnutrition, morbidity, high-altitudes
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Introduction

Rational and healthy nutrition defines the quality of life; growth, development, mental and physical health, increases immune response of organism to the unfavorable effect of environment, which has importance in children especially (1). During last years, diet ingredients people consume have changed, towards deficiency of vitamins and essential microelements (2-4). Unbalanced nutrition is also associated with loss of ability to work and have unfavorable dynamics leading to loss of health and significantly contributing to demographic problems, affecting mostly people of work age.

In children and adolescents, malnutrition is one of the causes of high cardiovascular and noninfectious diseases mortality (5-9). According to recent data, malnutrition affected about 165 million children of age < 5 years old, was responsible for 45% of total mortality in this population (10, 11). Pediatric malnutrition (under nutrition) is defined as an imbalance between nutrient requirement and intake, resulting in cumulative deficits of energy, protein or micronutrients that may negatively affect growth

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development and other relevant outcomes (12, 13).

Balanced nutrition depending on age, sex, climate zone of living and health state, prevents development of several nutrition dependent diseases (14, 15). Despite this, socio-economic changes in our country do not allow providing population with balanced rational nutrition and especially children and adolescents in many families. The improvement of health population can only be achieved by applying complex interventions, including the healthy nutrition, defined as defined as presence of physical, social and economic availability of safe food in sufficient amount that meets physiological demand of organism to sustain active and healthy lifestyle (16). The population of Kyrgyz Republic was 6,000,000 by the end of 2015 and 17.9% (1,043,629) of them were children of school age. The contemporary average population density in republic is 28 persons per km^2. Currently, because of economic crisis and fall in living standards of the most part of Kyrgyzstan population, there are changes in demographic processes as birth rate, mortality, natural increase and dynamics of population, and migration.

The aim of the current study was to analyze the nutrition status and morbidity of adolescents in Kyrgyz Republic.

Methods

The data for the current study were obtained from the database of National statistical

Committee of Kyrgyz Republic for the period of 2009-2014 on nutritional and energy value of nutrition of urban and rural population of Kyrgyz Republic living in conditions of high-, middle- and low-altitudes (17, 18). We compared obtained data with current recommended norms of consumption for food ingredients, energy and food products for different population groups of Kyrgyz Republic (19). The malnutrition levels for children and adolescents were defined according to the generally accepted standards (13). The data were analyzed using software package Analysis ToolPack – VBA, EXCEL – 6.0

Results

According to national statistical committee of Kyrgyz Republic (2015 data) (17), 30.6% of population live below poverty line, among them 1.2% live in poverty, and most of this population (32.6%) live in rural area. Poverty level is higher in high altitude area as compared to valley (39.3% vs. 37.3%). Among population of children of 0-17 year's age-range, 44.6% live below the poverty line and 5.6% in poverty. Number of children in families living above poverty line is 1.9, and in families living below poverty line – 2.7. Malnutrition rate among girls is 6.5%, among boys – 3.3%.

Table 1. Intake of main food products (gr/day)

Food product	2010	2011	2012	2013	2014	Mean	Recommended normal value
Meat and meat products (adjusted for meat)	54.8	54.8	55.1	54	54.5	54.6	128
Milk and milk products (adjusted for milk)	246	227.8	200.4	215.4	220.1	221.9	500
Eggs, n	0.17	0.16	0.16	0.17	0.18	0.17	1.2
Fish and fish products	3.5	3	3.5	3.3	3.5	3.4	28
Sugar	42	40.6	38.4	38.4	36.2	39.1	65
Plant oil and other fat	31.5	31	31	31.5	30.7	31.1	15
Potatoes	131.3	128.8	123.3	123.9	120.6	125.6	210
Vegetables	230.5	219.8	205.3	202.8	212.2	214.1	364
Fruits	70.4	73.7	61.7	63.9	70.4	68	285
Bread and wheat products (bread and pasta adjusted for flour, flour, cereals and beans)	348.4	344.8	344.2	348	356.6	348.4	276

Table 2. Protein, fat, carbohydrates and energy value of daily food intake per family for 2014.

Nutritional and energy value	Total population	Poverty level	Below poverty level
Proteins, gr % of total calories value	61.2 10.9	46.2 10.5	30.3 10
Fat, gr % of total calories value	62.5 24.9	46.4 23.8	30.1 22.5
Carbohydrates, gr % of total calories value	361.9 64.2	288.1 65.7	203.2 67.5
Energy value, kcal	2254	1755	1205

Level of healthy nutrition availability n Kyrgyzstan is low, especially in remote areas and villages. For the past 5 years, there have been several raises in world prices for food affecting prices for food in our country. Prices for food products have risen by 41.7% for past 5 years as compared to prices in 2010. The increase in price for bread and flour products for a period 2010-2015 was equal to 44.8%, including increase in price for flour by 1.6 times and bread (by 54.3%). The prices for raw meat for past five years showed stable increase. In 2015 as compared to 2010 the prices for meat increased by 68.2%, milk – 10.5%, fruits – 20.3% and sugar – 7.6%. Imbalance in rise of food products prices and income/salaries reduced consumption of main food products: meat, eggs, fish, mild products, vegetables and fruits. According to statistical data, in 2014 minimum living standard expenses in KR was 4957,71 som or 72.9 US dollars per month per person. At the same time, the expenses for food products in 2013 reached 2937.6 som and in 2014 – 3223.15 som. Real expenses for food products were 65% in 2015 that is higher by 1.2% as compared to 2009. As can be seen from current analysis, expenses for balanced nutrition increased and quality of food ingredients consumed by the majority of population worsened.

Comparison of mean consumption of food products for a period of 2010-2014 with recommended norms of consumption of food ingredients, energy and food products (2011) showed that consumption of milk and its products was only 44.4% of recommended consumption quantity, meat products – 42.6%, fish products – 12.1%, vegetables – 58.8%, fruits – 23,9.%. However, consumption of several products was higher than recommended, i.e. fat, butter and bread products (Table 2.)

The daily protein level was only 10.9% with normal range of 10 to 15%, being on the lower level of normal values for population living in poverty.

The protein content (Table 2) in diet is compensated by consumption of wheat products, while it is known that amino acid value of plant proteins is lower in comparison to meat proteins. The deficiency of proteins in nutrition negatively affects the growth and development of children and adolescents; digestion problems of food ingredients lead to damage of heart muscle, worsening of memory and work capacity. These can be explained by that proteins practically take part in all functions of organism. It should be also noted that protein deficiency reduces immune response to infections, and frequently is accompanied by vitamin and microelements deficiency.

The value of fat is also lower than recommended norms for different climate zones of Kyrgyzstan. Carbohydrates are mainly represented by group of bread, sweet, wheat products, vegetables and potatoes. The carbohydrates value is equal to 110% of recommended physiological norms. The ratio of proteins: fat: carbohydrates for total population was equal 1:1:5.9 (recommended norm 1:1:4), for poor – 1:1:6.2 and for population living below poverty line – 1:1:6.7. Thus, the main contributor to energy value of ration was carbohydrates. Excessive carbohydrate intake stimulates fat development and obesity. Hyperglycemia also facilitates development of diabetes, atherosclerosis and cardiovascular diseases. Also, it is associated with increased incidence/ prevalence of caries and allergy.

Our analysis demonstrated a high prevalence of cardiovascular, respiratory,

gastrointestinal and endocrine system diseases and neoplasms, due to disorders of nutrition (Table 3).

Table 3. Morbidity of adolescents (15-17 years) of Kyrgyz Republic

Disease class	Per 1000 adolescents				
	2010	2011	2012	2013	2014
All diseases	577.7	566.5	658.3	642.8	611.0
Tumors	0.8	0.7	1.1	1.1	1.0
Hematological diseases	39.9	34.6	35.1	34.3	33.6
Endocrine diseases and nutritional disorders	45.4	31.7	34.4	37.0	29.4
Cardiovascular diseases	5.0	6.5	4.8	5.8	4.3
Respiratory diseases	139.4	137.6	132.0	135.6	143.4
Gastrointestinal diseases	63.8	76.9	140.4	116.6	113.2
Diseases of skin	40.8	38.5	38.2	42.4	39.3
Diseases of eye	34.9	32.3	50.5	45.3	41.5
Diseases of ear	38.0	44.5	40.1	42.9	33.9
Urological diseases	45.7	42.0	42.7	43.2	41.1

As can be seen from Table 3, there is a significant growth in morbidity of adolescents for the period of 2010-2014, especially diseases of gastrointestinal system (by 43.6%), psychiatric disorders and behavior disorders (by 27.9%), neoplasms (by 20.0%), disease of eye (by 15.9 %), bone-muscle system and connective tissue disorders (by 13.3%).

Discussion

Our study demonstrated that healthy nutrition level among adolescents in Kyrgyz Republic is low, among them 36.1% of population lives in poverty, especially there is a high level of children poverty 44.6% mainly in rural and high-altitudes, 22.6% of children are physically underdeveloped, 18.2% suffer from iron-deficient anemia, 808 children have tuberculosis. There is a rise in prices for food, leading to the increase in expenses of families` budget for food – 65% of minimal wage, there qualitative content of diet of majority of population worsened – meat, fish, vegetables and fruits. There is deficiency in meat protein that influences the growth and development of children and heart muscle, memory and work capacity and reduced immune status in children and adolescents. Nutrition is irrational and unbalanced and includes mostly carbohydrates– bread, pasta and potatoes- cheap products, that is why among the adolescents there is high frequency of cardiovascular, respiratory, alimentary, endocrine system, neoplastic diseases, due to nutrition.

Our data are in part support the previous study that demonstrated higher prevalence of vitamin and iron deficiency in adolescents residing in rural areas as compared to urban areas (3). Several studies have also demonstrated association of undernutrition with obesity, microelements deficiency, anemia, hypertension, high rate of infectious and parasitic diseases among children and adolescents in developing countries (5-7, 9).

Several factors may play a role in unbalanced nutrition among adolescents – food insecurity, poverty, lack of healthy nutrition education, infectious disease and poor sanitation (3, 8, 10).

There are several limitations of the current study as the descriptive design based on analysis of database, thus further cross-sectional survey, prospective studies on malnutrition and morbidity, mortality among children and adolescents and interventional studies to improve nutrition in adolescents is required.

In conclusion, the nutrition of adolescents is unbalanced and unhealthy, with diet composed mostly of carbohydrates and fat, lacking proteins, accompanied by increased levels of infectious, cardiovascular and growth disorders, especially in rural and high-altitude regions. There is a need for interventions directed both to decrease poverty levels and increase awareness of healthy nutrition among adolescents and their families.

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