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Cardiovascular Diseases Risk Factors In Adolescents Of The East Kazakhstan Region: Urban-Rural Comparisons.

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ABSTRACT

Kazakhstan hold one of the first places in mortality statistics from cardiovascular diseases among the countries of the European Union, Central and Eastern Europe and Central Asia regions. Early prevention and national screenings in childhood and adolescent ages become the urgent measure for healthy nations. This cross-sectional study was created to determine the behavior risk factors of cardiovascular diseases in adolescents in urban and rural regions the East Kazakhstan. The research process was realized at secondary schools in adolescents from 11 to 16 years, total number was 729, mean age 13.8±1.5 years. We found that overweight and obesity prevalence according to BMI was distributed among urban teenagers in 58.2%, and among rural in 13.7%. Unhealthy food behavior was spread from 37% to 86.5%. More than 52.8% of the adolescents eating the fast food > than 3 d/week, and average 40.8% of adolescents spend < than 1 h/day for physical activity. Every second adolescent daily spend for screen time ≥ 2 h/day. The prevalence of overweight and obesity is high in both genders and in both urban or rural area. This study findings should be take in account policy makers for developing next steps of screening programs and prophylactic measures.

Keywords: Adolescents, Cardiovascular diseases, Obesity, Risk, Urban-rural health.

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INTRODUCTION

Past decades, childhood obesity is becoming a great public health issue. It is now evident from many studies that childhood obesity is correlated with adult overweight and obesity and the development of cardiovascular diseases (CVD) risk factors for adult age such as high blood pressure, type 2 diabetes mellitus, dyslipidemia, and metabolic syndrome [1].

CVD and type 2 diabetes mellitus have their reasons in school aged childhood, especially in obese children and adolescents, increasing very important opportunities for early lifestyle intervention in groups of risk. However, not all obese individuals are at the same risk for disease progression. Accurate screening of obese adolescents may identify those in greatest need for intensive intervention to prevent or delay future pathology [2].

Overweight and obese children have a higher prevalence of CVD risk factors [3]. CVD is the leading cause of death among adults in the United States. Although its overt manifestations, such as heart attack and stroke, do not usually emerge until adulthood, CVD risk factors are often present during childhood and adolescence [4]. A recent report indicated that 8% of US adolescents aged 12 to 19 years had high low-density lipoprotein cholesterol (LDL-C) in 1999–2006; similarly, 8% had a low high-density lipoprotein cholesterol (HDL-C) level. Seven percent and 14% of US adolescents in 2001–2006 had prehypertension/hypertension and increased level of fasting glucose, respectively, in the nationally representative study. Currently, the most prevalent CVD risk factors observed among adolescents are overweight and obesity. In 2009−2010, an estimated 34% of US adolescents aged 12 to 19 years were overweight or obese. Overweight and obesity have negative health consequences that extend beyond excess body fat and cosmetic concerns. Research indicates that being overweight or obese may place adolescents at increased risk for CVD risk factors such as hypertension, abnormal lipid levels, prediabetes/diabetes, and increased C-reactive protein [5-11].

The low prevalence of ideal cardiovascular health behaviors in US adolescents, particularly physical activity and dietary intake, will likely contribute to a worsening prevalence of obesity, hypertension, hypercholesterolemia, and dysglycemia as the current US adolescent population reaches adulthood. Population-wide emphasis on establishment of a good cardiovascular health behaviors early in life is essential for maintenance of ideal cardiovascular health throughout the lifespan [12]. Kazakhstan ranks first in mortality rates from CVD among the countries of the European Union, Central and Eastern Europe and Central Asia regions. According to official statistics the urban population often suffers from circulatory diseases than the rural. However, it should be noted that the incidence of the rural population has increased dramatically.

Despite the fact that the purpose of the introduction of modern diagnostics methods is early detection and increase the people lifespan, in the provision of diagnostic and preventive care are still significant gaps. Taking into account the rejuvenation the category of patients with CVD, is necessary to start screening at an earlier stage of life. However, mostly in the Screening programs are subjected to the diagnosis the adult population.

The Republic of Kazakhstan in 2011, occupied the fifth place in the world on the standardized mortality rate due to ischemic heart disease, amounting to 417.1 per 100,000 population. In the East Kazakhstan region this indicator was 905.0 per 100,000 population. Mortality from CVD was 52.8% of the total mortality of the population. This rate is determined primarily by two factors - ischemic heart disease and cerebrovascular disease, which share in the structure of mortality from CVD as a whole is 47.7% and 36.4%.

Aim

In this study, we subjected to determine the behavior risk factors of cardiovascular diseases in adolescents living in urban and rural regions the East Kazakhstan.

MATERIAL AND METHODS

The cross-sectional study was conducted at secondary schools of the East Kazakhstan region, Republic of Kazakhstan aimed at adolescents from 11 to 16 years. Calculation of the total sample size was realized in the soft SampleXS (http://www.brixtonhealth.com/samplexs.html). At the planning stage we prepared a paper-

based questionnaire with 33 questions in the Russian and Kazakh languages, and then independently back-translated to insure the accuracy of translation. The items included the specifics of adolescents such as demographics, residence, the behavior risk factors of cardiovascular diseases like overweight and obesity, unhealthy diet, sedentary lifestyle, screen time and sleep duration. Written informed consent was obtained from each an adolescent parent or guardian beforehand. The adolescents, their parents or guardians were insured in complete anonymity and confidence of the filled questionnaires. The response rate was 95.2% (729 out of 766). The study protocol was approved by the Local Ethics Committee of the Semey State Medical University, Kazakhstan. Assessment of potential risk factors for CVD, such as poor diet, sedentary lifestyle, screen time, sleep duration carried out on the basis of the protocol the World Health Organization (WHO) Childhood Obesity Surveillance Initiative (COSI) project.

The internal validity of the questionnaire was determined in the pilot study of 30 adolescents. The initial survey was conducted with a period in 2 weeks with repeated. For each question was calculated α-Cronbach coefficient, which showed the reproducibility of the responses with repeated survey from the same study. The valid rate was adopted at 0.8 or higher for each question. When α-Cronbach for an item was 0.79 or less, the question was excluded from the questionnaire.

The central tendencies for the continuous variables corresponding to the normal distribution are represented as a mean ± standard deviation. The categorical data are presented as absolute and relative numbers, with the calculation of a confidence interval for proportions (95% CI). The calculation of the CI for proportions with the adjusted estimate of Wald processed in the calculator available at http://www.measuringu.com/wald.htm. For the qualitative data a difference in the groups was determined by calculating the chi-square test (χ^2). P-score < 0.05 was assumed to be a critical for decision. The processing of data performed using SPSS 20 for Windows (IBM Ireland Product Distribution Limited, Ireland).

RESULTS

Baseline characteristics of enrolled to the study adolescents are presented in Table 1. A total number of respondents was 729, out of which 381 (52.26%) were girls and 348 (47.74%) were boys. The mean age was 13.8±1.5 years. There were 503 (69.0%) Kazakh, 211 (28.94%) Russian and 15 (2.06%) other ethnicity. The urban regions residents were represented by 189 (25.93%) adolescents and 540 (74.07%) by rural regions.

Table 1: Baseline characteristics of the respondents (n=729)

Variable	% (n)
Mean age	13,8±1,5 years
Sex	
Female	52,26 (381)
Male	47,74 (348)
Ethnicity	
Kazakh	69,0 (503)
Russian	28,94 (211)
Other	2,06 (15)
Residence	
Urban	25.93(189)
Rural	74.07(540)

In evaluating of overweight and obesity according to BMI was found that 13.99% of girls (n = 102) and 11.25% (n = 82) boys were overweight or obese (Table 2).

Table 2: Body mass index category in adolescents by gender (n=729)

Variable	Girls			Boys		
	n	%	95% CI	n	%	95% CI
Overweight or obesity	102	13.99	11.7-16.7	82	11.25	9.2-13.8
Overweight	85	83.33	74.8-89.4	67	81.71	71.9-88.7
Obesity	17	16.67	10.6-25.2	15	18.29	11.3-28.1

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At the stage of evaluating the overweight and obesity prevalence according to BMI depending on the place of residence was determined that more often this risk factor of CVD was distributed among urban teenagers - 58.2%, than among rural - 13.7%, (χ^2=146.9; D.f.=1; p<0.001) (Table 3).

Table 3: Body mass index category in adolescents by residence (n=729)

Variable	Urban (n=189)			Rural (n=540)		
	n	%	95% CI	n	%	95% CI
Overweight or obesity	110	58.2	51.1-65.0	74	13.7	11.1-16.9
Overweight	85	77.3	68.5-84.2	64	86.5	76.7-92.7

In the study of the residence place and adherence to the incorrect food behavior were found that Having breakfast at least 7 days in a week is equally distributed among urban and rural children: 37.6% (95% CI: 31.0-44.7) and 36.7% (95% CI: 32.7-40.8) respectively (χ^2=1.3; D.f.=1; p=0.8) (Table 4).

Table 4: The prevalence of "unhealthy diet" among adolescents of the EKR and the place of residence (n=729)

Breakfast and food consumption frequency (%)	Urban (n=189)			Rural (n=540)		
	n	%	95% CI	n	%	95% CI
Having breakfast < 7 days a week	71	37,6	31,0-44,7	198	36,7	32,7-40,8
Eating fruits < 7 days a week	123	65,1	58,0-71,5	281	52,0	47,8-56,2
Eating vegetables (excluding potatoes) < 7 days a week	116	61,4	54,3-68,0	279	51,7	47,5-55,9
Drinking soft drinks containing sugar > 3 days a week	151	79,9	73,6-85,0	297	55,0	50,8-59,1
Eating foods like potato chips (crisps), corn chips, popcorn or peanuts > 3 days a week	187	98,9	96,0-100,0	205	38,0	34,0-42,1
Eating foods like candy bars or chocolate > 3 days a week	111	58,7	51,6-65,5	313	58,0	53,8-62,1
Eating foods like biscuits, cakes, doughnuts or pies > 3 days a week	118	62,4	55,3-69,0	410	75,9	72,1-79,4
Eating foods like pizza, French fries (chips), hamburgers, sausages or meat pies > 3 days a week	156	82,5	76,5-87,3	252	46,7	42,5-50,9

We have found statistically significant difference in the two groups on the factors of frequency of eating of fruits and vegetables, excluding potatoes. It was found that urban children are more likely to have the opportunity 7 days a week to take in food fruits (χ^2=9.64; D.f.=1; p<0.05) and vegetables (χ^2=5.31; D.f.=1; p=0.02).

Drinking of soft drinks containing sugar more than 3 days a week, more often was observed in the urban respondents - 79.9% (95% CI: 73.6-85.0) versus rural - 55.0% (95% CI: 50.8-59.1) (χ^2=36.6; D.f.=1; p<0.05).

Eating foods such as potato and corn chips, popcorn or peanuts more often than 3 days a week was noted more than ninety-eight percent of cases among the urban adolescents (95% CI: 96.0-100.0) and more than sixty per cent of the rural (95% CI: 65.0-71.7) (χ^2=209.4; D.f.=1; p<0.05).

Eating foods such as candies or chocolate > 3 days a week on average in the population was observed in more than half of all observations - 58.3% (95% CI: 54.7-61.8).

It was found that eating of such part of fast food, like cookies, cakes, donuts or pies for more than 3 days a week was more prevalent among rural adolescents 75.9% (95% CI: 72.1-79.4) than urban, 62.4% (95% CI: 55.3-69.0) (χ^2=12.76; D.f.=1; p=0.0003).

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Eating pizza, French fries, hamburgers, sausages and meat pies was more common to urban residents included in the study - 82.5% (95% CI: 76.5-87.3) versus 46.7% (95 % CI: 42.5-50.9) (χ^2=73.1; D.f.=1; p<0.05). This predominance seems logical in view of the greater prevalence of fast food sale points in the cities.

The opposite situation was observed regarding physical activity outside. Less than one hour per day to spend on games, running and walking more than a third of all urban adolescents of the EKR - 44.4% (95% CI: 37.5-51.6), compared with the same pastime among rural teenagers who were indicated about spending least one hour in the street - 38.7% (95% CI: 34.7-42.9), (χ^2=5.3; D.f.=1; p=0.05) (Table 5).

Table 5: The prevalence of "sedentary lifestyle" among adolescents of the EKR and place of residence (n=729)

Physical activity	Urban (n=189)			Rural (n=540)		
	n	%	95% CI	n	%	95% CI
Using inactive transportation going to and from school*	112	59,3	52,1-66,0	104	19,3	16,2-22,8
Going to a sports or dancing club <2 d/week	71	38,0	34,0-42,1	308	57	54,0-61,1
Playing outside <1 h/d	84	44,4	37,5-51,6	209	38,7	34,7-42,9

* – school bus or private vehicle of parents

It was found that adolescents in urban areas significantly more likely to get to school and back home on a school bus or private vehicles - 59.3% (95% CI: 52.1-66.0) than adolescents living in rural areas - 19.3% (95% CI: 16.2-22.8), (χ^2=107.4; D.f.=1; p<0.05).

Opportunities to visit the sports or dance < 2 days a week, often were marked by urban adolescents (χ^2=21.3; D.f.=1; p<0.001). Only 38.0% (95% CI: 34.0-42.1) urban adolescents visit sports or dance clubs at least two days a week. Rural adolescents in more than half of the cases - 57% (95% CI: 54.0-61.1), such possibility did not have.

A significantly higher percentage of adolescents (χ^2=90.7; D.f.= 1; p<0.05), residing in urban areas - 85.2% (95% CI: 81.9-91.6) spends on watching TV, computers, tablets, smartphones, etc. time greater than or equal to 2 hours a day. In this regard, a group of teenagers living in rural areas the EKR was more favorable for the prevalence of «screen time» risk factor. But here, more than forty percent of adolescents - 45.2% (95% CI: 41.0-49.4) look at the screen for more than 2 hours a day. Low sleep duration (less than 9 hours per day) had a higher proportion in the study group of urban adolescents - 49.2 (95% CI: 43.4-57.7) compared to their rural counterparts - 11.9% (95% CI: 9.4-14.9), (χ^2=115.6; D.f.=1; p<0.05) (Table 6).

Table 6: Prevalence of risk factor "Screen time and sleep duration" among adolescents of the EKR and place of residence (n=729)

Screen time and sleep duration	Urban (n=189)			Rural (n=540)		
	n	%	95% CI	n	%	95% CI
Screen time > or = 2 hours a day	161	85,2	81,9-91,6	244	45,2	41,0-49,4
Sleep duration < 9 hours a day	93	49,2	43,4-57,7	64	11,9	9,4-14,9

DISCUSSION

In the European Region, more than 50% of the population are overweight or obese [13]. Excessive intake of saturated fat, trans-fatty acids, sugars and salts increases the risk of overweight and obesity, CVD, diabetes and some types of cancer [14-16]. These problems are the main causes of morbidity and disability throughout the Region. Out of the six WHO regions the European Region has the highest burden of non communicable diseases. In the four main categories of them which include CVD, diabetes, cancer and respiratory disease, and about 77% of mortality and disability [17].

In Kazakhstan, qualitative and balanced food behavior of population is a priority direction of healthy lifestyles development policy and forms a part of the national study of the lifestyle risk factors prevalence in the population. Particularly noteworthy are problems of rational nutrition of children and their dynamics in the context of early prevention of obesity, metabolic syndrome and cardiovascular diseases.

WHO main strategy on struggle against overweight and obesity among adolescents today is the WHO European Childhood Obesity Surveillance Initiative - COSI. The strategy is designed to identify trends in overweight and obesity among primary school children between the ages of 6 to 9 years. Since 2015/2016, Kazakhstan plans to join the fourth round of the project [18].

This study was aimed to determine the behavior risk factors of cardiovascular diseases in adolescents living in urban and rural regions the East Kazakhstan. We have found that 13.99% of girls and 11.25% of boys have overweight or obesity. The risk factor «unhealthy diet» among adolescents of the EKR distributed from 37% to 86.5%, more than 52.8% of the respondents consume fast food more than 3 days a week, average 40.8% of adolescents devote less than 1 hour per day for physical activity, every second adolescent daily aggravates own hypodynamia condition with spending time greater than or equal to 2 hours per day on viewing screens of gadgets.

CONCLUSION

Prevalence of risk factor for obesity and as a consequence of the possible development of CVD in the future is quite high in all compared groups, regardless of gender or living in urban or rural area. Joining of Kazakhstan to the COSI should be focused not only on children but also on adolescence.

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REFERENCES

[1] Herouvi, D., et al., Cardiovascular disease in childhood: the role of obesity. European journal of pediatrics, 2013. 172(6): p. 721-732.
[2] DeBoer, M.D., Obesity, systemic inflammation, and increased risk for cardiovascular disease and diabetes among adolescents: A need for screening tools to target interventions. Nutrition. 29(2): p. 379-386.
[3] May, A.L., E.V. Kuklina, and P.W. Yoon, Prevalence of cardiovascular disease risk factors among US adolescents, 1999– 2008. Pediatrics, 2012. 129(6): p. 1035-1041.
[4] Raitakari, O.T., et al., Cardiovascular risk factors in childhood and carotid artery intima-media thickness in adulthood: the Cardiovascular Risk in Young Finns Study. Jama, 2003. 290(17): p. 2277-2283.
[5] Control, C.f.D. and Prevention, Prevalence of abnormal lipid levels among youths---United States, 1999-2006. MMWR. Morbidity and mortality weekly report, 2010. 59(2): p. 29.
[6] Johnson, W.D., et al., Prevalence of risk factors for metabolic syndrome in adolescents: National Health and Nutrition Examination Survey (NHANES), 2001-2006. Archives of pediatrics & adolescent medicine, 2009. 163(4): p. 371-377.
[7] Ogden, C.L., et al., Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. Jama, 2012. 307(5): p. 483-490.
[8] Virdis, A., et al., Obesity in the childhood: a link to adult hypertension. Current pharmaceutical design, 2009. 15(10): p. 1063-1071.
[9] Lamb, M.M., et al., Association of body fat percentage with lipid concentrations in children and adolescents: United States, 1999–2004. The American journal of clinical nutrition, 2011. 94(3): p. 877-883.
[10] Lambert, M., et al., Prevalence of cardiometabolic risk factors by weight status in a population-based sample of Quebec children and adolescents. Canadian Journal of Cardiology, 2008. 24(7): p. 575-583.
[11] Lande, M.B., et al., Elevated blood pressure, race/ethnicity, and C-reactive protein levels in children and adolescents. Pediatrics, 2008. 122(6): p. 1252-1257.

[12] Shay, C.M., et al., Status of Cardiovascular Health in US Adolescents Prevalence Estimates From the National Health and Nutrition Examination Surveys (NHANES) 2005–2010. Circulation, 2013. 127(13): p. 1369-1376.
[13] Stevens, G.A., et al., National, regional, and global trends in adult overweight and obesity prevalences. Population health metrics, 2012. 10(1): p. 1.
[14] Willett, W.C. and M.J. Stampfer, Current evidence on healthy eating. Annual review of public health, 2013. 34: p. 77-95.
[15] Ley, S.H., et al., Prevention and management of type 2 diabetes: dietary components and nutritional strategies. The Lancet, 2014. 383(9933): p. 1999-2007.
[16] Zaidi, N., et al., Lipogenesis and lipolysis: the pathways exploited by the cancer cells to acquire fatty acids. Progress in lipid research, 2013. 52(4): p. 585-589.
[17] Lozano, R., et al., Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet, 2013. 380(9859): p. 2095-2128.
[18] Wijnhoven, T.M., et al., WHO European Childhood Obesity Surveillance Initiative: health-risk behaviours on nutrition and physical activity in 6–9-year-old schoolchildren. Public health nutrition, 2015. 18(17): p. 3108-3124.