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Milk consumption, indicators of growth and body mass index in the Uzbek and Tajik population in Uzbekistan.

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ABSTRACT

Background: *It is known that lactose intolerance is prevalent in the Turkish and Indo-Iranian peoples of Central Asia, and prevalence is related to the presence or absence of the genotype C/T-13910. Some studies have reported changes of weight occurring from the use of milk products according to the types of dairy products used. Our aim was to examine indicators of growth and body mass index (BMI) in the Uzbek and Tajik population in two regions of Uzbekistan in relation to milk consumption, the presence of the genotype C/T-13910, and self-reported evidence of lactose intolerance, in order to see to what degree growth and BMI is affected by milk consumption in these two distinct but comparable populations. Uzbek and Tajik families share the same social, economic and culinary habits, so these should not be confounding factors for comparing the growth and development of children in these two population groups.*

Results: *Single nucleotide polymorphisms were examined in 100 Uzbeks and 100 Tajiks for the presence of the genotype C/T-13910 and for milk intolerance. Anthropometrical measurements were made of growth and body mass index (BMI) of the target Uzbek and Tajik population and compared according to the presence of genotypes for lactase persistence or lactase non-persistence. The results show that there is no statistically significant difference (95% CI, $p>0.05$). Comparison of growth and BMI of a further 187 Uzbeks and 137 Tajiks according to their consumption of milk likewise shows no statistical significance (95% CI, $p>0.05$). A small percentage in each group, however, self-reported dyspepsia symptoms after milk consumption.*

Conclusion: *The study demonstrates that comparable groups of the Uzbek and Tajik populations in Uzbekistan do not differ in the prevalence of genotype C/T-13910. Among Uzbeks and Tajiks the high prevalence of lactose intolerance does not appear to interfere with the use of milk and dairy products in small amounts, and this study therefore suggests that milk consumption, as practiced in these populations, is not the key factor affecting growth indicators and BMI of Uzbeks and Tajiks.*

Keywords: Hypolactasia, Anthropometry, Uzbek-Tajik Population

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INTRODUCTION

The majority of people lose their ability to digest lactose as they mature into adulthood. (1) So, the ability to assimilate calcium (Ca), through the use of milk and dairy products, decreases with age (2-4).

The enzyme lactase is developed in the brush border enterocytes of the mucous membrane of the child's small intestine during breast feeding and for some 5 -7 years afterwards. As a result of a change in the genotype of the lactase code transcription gene (LCT) of human beings 7500 years ago in Central and Northern Europe, some populations occupying these areas have a variant in the gene LCT C/T-13910 of a polymorphism which codes continuation of lactase synthesis throughout all human life (8,9). In Sweden, the allele C/T is present in 93-95% of the population (10), in Dutch populations it is 99% (11), and in the German population it varies from 77% to 94% (12.) At the same time, a large section of the world's population shows a high prevalence of the genotype C/C-13910. This group includes the following: Chinese 92.3%, Mongols 87.9%, Kazakhs 76.4% (13), Uzbeks 81% (14) and Tajiks 83% (15). Human height is generally determined by hereditary factors, and, to a smaller extent, by the type of food and transmitted diseases encountered in childhood (16). It is noted, however, that improvement of food, social and living conditions, and increase in the health of a nation promotes a significant increase in growth parameters of the population. In support of this, in the North American population growth indicators have increased over the last 200 years. It is known that there have been no major changes in the genetic type of the population groups living in North America (17).

Calcium is the main chemical element responsible for creating the basis of bone fabric (18). Milk and dairy products are rich in Ca, and are important for the correct development of the child's skeleton; hence, breast feeding and the inclusion of fresh milk and dairy products in the diet of babies and children is important (19). In the early 1900's it was shown that the presence of milk in the diet of school children promoted an increase in their growth (20, 21).

A number of studies of the density of the femurs of teenage girls and women in the fertile age band who regularly use milk and dairy products showed that their femurs have significantly higher bone density compared with those who do not drink milk (22, 23).

Along with populations with high prevalence of lactose tolerance, where fresh milk is drunk in large amounts (Northern and Central Europe), there are other populations who do not drink much milk but prefer to use dairy products, as in the countries of Central Asia. In Kazakhstan and Kyrgyzstan, where cattle breeding is well developed, a fermented dairy product was widely adopted – "kumis" (fermented mare's milk). In Uzbekistan and Tajikistan, where agriculture is predominant, yogurts are used ("katik", "dzhugorot" and cheese "chakka"), and milk in small amounts. As with other Asian races, representatives of the above peoples do not differ much in height.

The aim of this study therefore was to examine the growth indicators and body mass index in the Uzbek-Tajik population in relation to milk consumption and lactose intolerance according to the presence or absence of genotype C/T-13910

MATERIALS AND METHODS

The study was carried out in the Andijan and Bukhara regions of Uzbekistan. Selection by a randomization method was carried out among 2771 adult ethnic Uzbeks in the Andijan region, and among 1181 adult ethnic Tajiks in Bukhara. 100 inhabitants from the "Fayziobod" rural district in

Andijan, and 100 from the "Shovgon" rural district in Bukhara, were entered into the study for genotyping.

To assess the influence of milk use on indicators of growth and weight, a questionnaire was administered to 187 Uzbeks and 137 Tajiks concerning intolerance to milk. The age of the surveyed participants ranged from 16 to 70 years.

Uzbek and Tajik families have sufficiently similar lifestyles and social status (including levels of wealth) so that there are similar influences on the quality of food for the growing child.

The study was approved by the National Ethics Committee at the Ministry of Health of Uzbekistan. Informed consent was obtained from the subjects who participated in the study.

The questionnaire consisted of questions concerning the individual's health, personal data (ethnicity, including ethnicities going back three ancestral generations), anthropometric indicators, symptoms of milk and dairy product intolerance, and attitude to milk consumption.

Height, weight were measured by internationally accepted standardized procedures (24). BMI was calculated as weight/height^2 (kg/m^2).

Genotyping

DNA was isolated from venous blood using the Diatom ™ DNA Prep 200 DNA purification kit (Isogene Lab. Ltd. Invitrogen, USA) according to the manufacturer's protocol. The presence of genomic DNA was verified by 0.9% agarose gel electrophoresis with ethidium bromide, followed by visualisation under UV light on a WiseDOC gel documentation device. SNP identification was achieved by polymerase chain reaction/restriction fragment length polymorphism (PCR/RFLP). To identify alleles of the SNP C/T-13910, a fragment of 201 bp was first amplified using the primers: 5'-TGGCAATACAGATAAGATAATGGA-3' and 5'-GCTTTGGTTGAAGCGAAGAT- 3'. Polymerase chain reaction (PCR) amplifications were carried out in 0.2-mL PCR tubes, using a GenePack PCR Core kit (Isogene Lab. Ltd., Invitrogen) with lyophilised components. The procedure has been previously described in detail (14,15). The association between genotype variants, milk consumption/anthropometric indicators was tested using Student's t-test analyses.

RESULT AND DISCUSSION

Prevalence: A total of 324 participants responded to the questionnaire on detection of intolerance to milk and dairy products. Of these, 181 were men and 143 women. Breakdown by age groups was: 124 aged 16-29 years, 102 aged 30-49 years, and 98 aged 50-70 years. Genotyping for lactase insufficiency carried out in 100 Uzbeks and 100 Tajiks revealed the existence of genotype variant of C/C-13910 in 81% of Uzbeks and 83% of Tajiks. Testing other members of the Uzbek and Tajik population revealed an allele of genotype of C/T-13910 that corresponds to a genotype for persistence of lactase. Despite the large prevalence of hypolactasia among Uzbeks and Tajiks, representatives of these populations use fresh milk in small amounts:100 -200 gm per day. 17.1% of Uzbeks and 25.3% of Tajiks indicated the onset of dyspepsia symptoms after milk consumption (bloating, diarrhea and abdominal pain).

Anthropometrical measurements of growth and BMI of 100 Uzbeks and 100 Tajiks and comparing them according to whether they carry variants of a genotype for lactase persistence or lactase non-persistence show no statistically significant differences (Tab. 1)

Indicators of growth and BMI of persons according to variant of C/T-13910

Table 1

Anthropometric indicators	Lactase persistence (n-36)	Lactase non-persistence (n-144)
Height in cm	168 ±1.5	167.5 ±0.7
BMI as kg/m^2	24.3 ±0.8	24.1 ±0.4
Women/Men	14/22	65/99

95% CI., p>0.05 indicator for height and BMI vs LP and LNP.

Anthropometrical measurements of growth and BMI of Uzbeks and Tajiks and comparing these according to milk use demonstrate that in the surveyed groups there are no significant differences (Tab. 2. 3).

Indicators of growth and BMI at Uzbek persons according to milk intake

Table 2

Anthropometric indicators	Low milk intake,100-200 dl/day (n-78)	No milk intake (n-109)
Height in cm	169.0 ±1.0	169.3 ±0.7
BMI as kg/m^2	23.9 ±0.5	24.6 ±0.3

Women/Men	30/48	52/57

95% CI p>0,05 indicator for height and BMI vs low milk intake and no milk intake.

Indicators of growth and BMI at Tajik persons according to milk intake
Table 3

Anthropometric indicators	Low milk intake, 100-200 dl/day (n-89)	No milk intake (n-48)
Height in cm	167.1 +0.9	166.4+1.3
BMI as kg/m^2	24.4+2.5	23.4+0.4
Women/Men	38/51	23/25

95% CI p>0,05 indicator for height and BMI vs low milk intake and no milk intake.

A study of the genotype for lactase intolerance in the Uzbek and Tajik population showed high prevalence of hypolactasia in these ethnic groups of the population living in Uzbekistan. The variant of a gene of C/C-13910 was found in 81% of the surveyed Uzbeks and 83% of Tajiks. Such a high prevalence of a genotype of lactose intolerance among populations belonging to the Turkish and Indo-Iranian group of peoples living in Central Asia is probably linked to a weak penetration in this territory of the mutated alleles C/T and T/T and a recessive homozygous gene C/T-13910 (25, 26).

The large distribution of a genotype for hypolactasia in adults and the historical cultural use of milk and dairy products are likely related to each other. Uzbek and Tajik cuisine is indistinguishable.

Fresh milk is used in small quantities in the diet, and it is generally given to children. Adults prefer to use fermented dairy products.

In spite of the fact that Uzbeks and Tajiks drink milk only in small amounts, 17.1% of Uzbeks and 25.3% of Tajiks indicated classical symptoms of lactose malabsorbtion after consuming milk. At the same time, it is established that people with a genotype and a phenotype for lactose intolerance can easily have hypolactasia without showing any symptoms of dyspepsia with an intake of fresh milk in amounts of 100-200 gm, which is the equivalent of an intake of 12.5 gm of galactose (27-29).

The limited consumption of milk reduces the possibility of obtaining enough Ca to promote density of bone fabric (30). It should be noted that despite the high prevalence of primary adult hypolactasia in the Uzbek and Tajik population, children, in preadolescent and adolescent years, drink milk in small quantities. People with lactase persistence also use milk in small amounts. Therefore, we have not found any differences of average values of growth according to genotype variants C/C or C/T-13910.

The fact that people with both groups of variants of alleles of C/T-13910 ingested milk suggested the need to compare the average values of growth for populations according to the amount of milk ingested.

Growth indicators in the Uzbek-Tajik population which included milk and dairy products in their diet did not differ from growth indicators in those populations which generally excluded milk. Influences on growth indicators of insulin-like growth factor I (IGF-I) in cow milk is probably insignificant with small and infrequent use of milk (31-33).

Use of milk with the different variants of the genotype of C/T-13910 does not affect the indicators of BMI and volume of subcutaneous fat (34-36). At the same time, some studies point to reported changes of weight from the use of products of milk according to the types of dairy products, depending on the level of initial BMI (37, 38). The results of this study show that the use of milk in small amounts in the Uzbek-Tajik population has no impact on index of body mass.

CONCLUSION

Among Uzbeks and Tajiks the large prevalence of lactose intolerance does not appear to interfere with the use of milk and dairy products in small amounts in these populations. We did not find that the consumption of milk influences either the indicators of growth or the BMI of Uzbeks and Tajiks in the population studied.

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