Comprehensive Assessment of Risk Factors for Childhood Obesity in Tashkent City, Uzbekistan

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Introduction: Obesity is one of the most significant public health problems in the twenty-first century. Taking a comprehensive approach to addressing this issue will allow us to consider all its aspects - dietary habits, physical activity, as well as socio-economic and socio-political factors in this field [1,2]. When considering them in terms of the epidemic spread of obesity as a problem that transcends temporal and national boundaries, particularly the alarming increase in obesity rates among children, it can be argued that this issue poses a threat to the health and well-being of future generations [7,8]. An important feature of the last decade is the increase in the number and change in the ratio of risk factors affecting children's health. Effective identification of these risk factors will help in targeted prevention of obesity development. Risk factors are determining health factors that have a negative impact on it. They contribute to the onset and development of diseases. A risk factor is a sign that is somehow associated with the future development of the disease. The development of the disease requires a combination of risk factors and the immediate causes of the disease. Often, it is difficult to identify the cause of the disease, as there may be several interrelated causes. Major risk factors, commonly known as significant ones, are distinguished, which are common to a wide range of diseases: smoking, physical inactivity, excess body weight, unbalanced nutrition, arterial hypertension, psychosocial stress, and so on. Primary and secondary risk factors are also distinguished [9,11]. Primary factors are those that negatively affect health: an unhealthy lifestyle, environmental pollution, a heavy family history, inadequate healthcare services, and so on. Secondary risk factors include diseases that exacerbate the course of other diseases: diabetes, atherosclerosis, hypertension, and so on. [12,13,14]. In this research work author will identifying risk factors for the development of obesity in preschool-age children residing in Tashkent city.

Materials and Methods: A total of 32 girls and 26 boys aged 5 to 6 years with a diagnosis of exogenous constitutional obesity, living in Tashkent, were examined. The children were examined at the outpatient clinic of the Republican Specialized Research and Practical Medical Center of Endocrinology (RSRPMCE) of the Ministry of Health of the Republic of Uzbekistan. Patients with obesity were under outpatient supervision. The diagnosis was based on anamnestic and anthropometric data, as well as the results of examinations by hygienists, pediatricians, and endocrinologists. During the outpatient examination, the nutritional status, well-being, activity, and mood of the patients were assessed. Anthropometric studies included bioimpedance measurement of body composition, determination of body mass, body mass index (BMI), waist and hip circumference (WC/HC), and fat mass quantity. Measurements were taken using Martin's anthropometer, calipers, and standard medical scales.

To assess the significance of obesity risk factors in children, we conducted a mathematical analysis of the frequency of leading risk factors, calculating the corresponding indicators.

Through questionnaires, we examined dietary habits, physical activity, leisure organization, harmful habits, family socioeconomic status, and parental education and profession data. The questionnaires were designed in accordance with the requirements commonly used in sociological research.

To study the socio-hygienic, biological, and other factors influencing the development of obesity in children, we conducted a case-control sociological study in families with children diagnosed with obesity (cases) and families with healthy children (controls). Data were collected through surveys and extracted from the medical records of children with obesity. The control group consisted of 50 children with normal weight (healthy), while the cases included 58 children with excess body weight (obesity). Subsequently, we used mathematical and statistical methods to determine the prevalence of these factors in the case and control groups. When comparing them, relative risk coefficients were calculated.

Additionally, by analyzing the ratio of the highest level of relative risk to the lowest level in each factor category, we calculated weight coefficients, i.e., the ranking positions that each factor occupies in terms of significance in the development of obesity in children.

To assess the risk of obesity development in children, we used one of the modern methods of evidence-based medicine and clinical epidemiology: the case-control method and the relative risk indicator. The "case-control" method examines the frequency of risk factors. The fundamental plan of the "case-control" study is based on selecting two comparable (in terms of materials and characteristics) groups of patients from a population. One group has the disease (cases), and the other (controls) does not have the studied disease. Subsequently, the frequency of exposure to the studied factor is retrospectively determined in both groups.

The obtained data allow us to calculate the odds ratio for the presence of a risk factor for the development of the disease, which is equivalent to the relative risk indicator.

Case-control studies, when designed correctly, offer several advantages: they are suitable for studying diseases with a long latent period and rare diseases, they are time-efficient and cost-effective, and they allow the assessment of a large number of potential etiological factors.

To establish a valid connection between a risk factor and a disease, the control group must be comparable to the case group in all aspects except for the presence of the disease. Cases and controls should be selected from the same or a similar environment. This helps avoid systematic errors.

The selection of an appropriate control group is a crucial task. It should consist of individuals who could have been chosen as cases if they had developed the disease, rather than the entire population without the studied condition. In other words, the control group should closely resemble the individuals in the case group in all aspects except for the presence of the condition under study. It is also important to consider the quantity, and a 1:1 ratio is recommended as it provides the maximum statistical power.

If the relative risk (RR) is 1.0, it means there is no difference in risks (the disease occurrence is the same in both groups).

RR=2.0 means that the risk of getting the disease is twice as high in the group exposed to the factor as compared to the group not exposed to the factor.

RR=1.6 means that the risk of getting the disease in the group exposed to the factor is 1.6 times higher than in the group not exposed to the factor (or the risk is 60% higher in the group exposed to the factor).

RR>1 indicates a protective effect of the risk factor when the risk factor has a protective, rather than harmful, effect.

Research Results: According to our data, excess body weight was found in 32 girls and 26 boys aged 5 to 6 years. The body mass index for girls was 21.8±3.9, and for boys, it was 23.5±4.1.

There is a clear prevalence of obesity among girls, with a male-to-female ratio reaching 2:1. In this case, a predisposing factor is the greater subcutaneous fat layer in girls during infancy and sexual maturation.

When it comes to the epidemiology of different types (forms) of obesity, the most common is exogenous constitutional (or simple) obesity, accounting for 75-97% of cases. Among our subjects, the diagnosis of exogenous constitutional obesity of the first degree was established.

There is unquestionable genetic predisposition to obesity, which is confirmed by epidemiological research. The mechanisms of genetic influence may be associated with differences in somatotype, cellular composition of adipose tissue, hyperphagia, taste sensitivity, hyperglycemia, hyperinsulinism, hypometabolism, and enzymatic differences in lipogenesis and lipolysis [6]. The risk of a child developing obesity reaches 80% if both parents are obese. The risk is around 50% if only the mother is obese, about 40% when the father is obese, and approximately 7-9% when neither parent is obese. Among the children under our observation, 42% of the mothers had obesity of the second degree, 18% had obesity of the second degree in both parents, 20% had exogenous constitutional obesity of the first and second degree, and 20% of the parents did not have obesity.

A special survey of 6 girls and their parents revealed peculiarities in their feeding organization, diet, and eating behavior. Among the surveyed children, 13 boys and 16 girls (aged 6) exhibited emotional eating disorders. In this type of eating disorder, the stimulus for food intake is not hunger but emotional discomfort. People eat not because they are hungry, but because they feel uneasy, anxious, irritated, have a bad mood, are upset, bored, lonely, etc. Conversations with the girls revealed that they often experience anxiety related to excess weight, feelings of self-disgust, the appearance of secondary sexual characteristics, and frequently, they feel lonely. In boys, emotional eating disorders were associated with exam preparation, exam failure, poor relationships with friends, especially girls. Among the surveyed children, 12 boys and 21 girls were found to have a disturbance in their daily eating pattern due to the presence of the nocturnal eating syndrome. This form was first described by A. Stunkard in 1959 and is quite common in clinical practice [10]. According to the patients with obesity, they cannot fall asleep without eating excessive amounts of food. Their sleep is superficial, anxious, and disturbed; they wake up several times during the night and consume some form of food (cookies, candy, pastries, etc.).

Through interviews with children and their parents, it was found that at the time of the survey, the daily diet was predominantly composed of fried potatoes for 70.2%, sweets and pastries for 61.3%, and pasta and dumplings for 48.5%. Many children named these foods as their favorites. After 10 PM, 36.6% of children consume food heavily. It was also found that from early infancy, they often ate before bedtime, and normal sleep followed fullness. According to the authors [8, 9], the nocturnal eating syndrome in the context of obesity can be attributed to a variant of ontogenetic psychophysiological immaturity. It was also found that most of the children suffering from obesity are characterized by a sedentary lifestyle. Unfortunately, over 3 hours per day are spent in front of a computer or TV by 60.03% of the children. There is no doubt that nutrition, as a way of providing building materials and energy for the entire process of a child's growth and development, plays a significant role in their future health.

It is well known that there are familial forms of obesity in which the heritability coefficient reaches 25%, indicating a significant contribution of genetic factors to the development of this syndrome. In our study, 4% of the participants had a familial form known as "constitutional-exogenous obesity."

Among the participants, there were some differences in the quality of their diets. According to questionnaire data, the diets of children with obesity were characterized by a predominance of bakery products, cereals, and confectionery items. High levels of saturated fats, salt, and sugar were observed, while fresh fruits and vegetables were consumed less than recommended, resulting in a 70% deficit in dietary fiber in their daily intake. In the primary group, the

consumption of meat and meat products (sausages, hotdogs, etc.) significantly exceeded recommended norms. Fast food items (hamburgers, hotdogs, french fries, etc.) were consumed without limitations during the week.

One of the factors contributing to the development of obesity is physical activity, which plays a substantial role in the formation and functioning of a healthy body. The surveyed participants engaged in physical exercises irregularly. Approximately 55% of boys and 38% of girls enjoyed watching TV shows and movies, while 23% did not engage in physical education, and 34% spent a significant amount of time sitting at the computer.

The socioeconomic status of the family also affects the development of childhood obesity. In the northeastern regions of Brazil, researchers have confirmed the hypothesis of a link between childhood malnutrition and adult obesity in families with very low income. Similar results were obtained in the United Kingdom, where children from families with high socioeconomic status were less likely to be overweight. However, the results of our study had a different focus. Assessment of the economic status of children with obesity showed that 85% of them lived without significant financial difficulties. Families with average incomes constituted 12% of the surveyed families. The educational level of parents is one of the leading factors in child development. The majority of mothers (78.0%) whose children suffered from obesity had completed secondary education. One in five of the women surveyed had no specific qualifications. A significant portion of the surveyed fathers had a secondary education (82.0%).

Therefore, based on our research, risk factors associated with the development of obesity include genetic predisposition, parental obesity, diet and eating behavior, the level of physical development, family economic status, the educational level of parents, and more.

According to our data, when studying the social status of parents, the relative risk (RR) was 1.32 for those who were civil servants. When examining pregnancy complications like toxemia and the risk of miscarriage, the RR was 2.9. In cases where mothers had artificial deliveries, the RR was 2.73. Artificial feeding led to a high RR of 2.23. Children who frequently fell ill had an RR of 1.77. When assessing associated diseases in parents, including obesity of different degrees (grade III RR of 4.05, grade I RR of 2.08, and grade II RR of 2.4).

Children's exposure to factors like eating snacks and pies at the same time carried an RR of 2.31, eating sweets resulted in an RR of 2.16, traveling to school by transport had an RR of 3.08, skipping fresh air activities led to an RR of 4.06, watching television had an RR of 2.3, spending 3 hours or more on the computer had an RR of 4.5, not helping with household chores had an RR of 2.67, and a child's satisfactory academic performance had an RR of 3.4.

When determining the leading factors contributing to childhood obesity, based on relative risk, it was evident that spending 3 hours or more on the computer, parental obesity, and lack of physical activity instead of outdoor play were the leading factors.

In conclusion, the results of our research indicate that in children with obesity, prominent factors include excessive computer use, low physical activity, parental obesity, commuting to school via transport, lack of physical sports activities, simultaneous snacking, and artificial child feeding, as well as daily consumption of sweets.

Therefore, excessive computer use and parental obesity are leading risk factors for the development of childhood obesity.

In summary, the widespread prevalence of obesity in the human population and the multitude of complications associated with excessive body weight (cardiovascular, metabolic, and endocrine) and the heterogeneity of its forms necessitate the search for early diagnostic criteria, identification of risk groups for obesity development, and the implementation of preventive measures to mitigate these risks, ultimately improving the quality and longevity of life.

Conclusions. Implementing preventive strategies to combat childhood obesity must commence during early childhood, emphasizing the incorporation of a healthy lifestyle, well-balanced nutrition, and regular physical activity as integral components of children's healthcare.

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