



THE PREVALENCE OF DIABETES AMONG CHILDREN, RISK FACTORS, AND DISABILITY (LITERATURE REVIEW)

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According to the World Health Organization (WHO), diabetes mellitus (DM) is considered a "disease of all age groups" [1, 2, 6, 12, 18, 22, 33, 38, 41, 46]. The global prevalence of diabetes is estimated at approximately 2.1%. In the future, it is predicted that the prevalence of diabetes will increase to 15-30%, which will pose a serious threat to public health and national healthcare systems [4, 10, 21, 35].

Type 1 diabetes (T1D) is an autoimmune disease in individuals genetically predisposed, where chronic lymphocytic insulin T-cells lead to the destruction of β -cells, subsequently leading to absolute insulin deficiency with a tendency for diabetic ketoacidosis to develop [47].

According to the International Diabetes Federation (IDF, 2019) report, the prevalence of Type 1 diabetes in children and adolescents is growing annually, particularly among children under 15. In 2019, the annual increase in T1D cases was approximately 3%. Worldwide, about 1.1 million children and adolescents under 20 suffer from T1D. Every year, about 98,000 new cases of T1D are diagnosed in children and adolescents under 15. When the age range extends up to 20 years, this number reaches 129,000 [48].

The prevalence of diabetes varies significantly across countries:

The highest rates (over 20 cases per 100,000 children per year) have been recorded in Scandinavian countries (Finland, Sweden, Norway) and Italy.

The lowest rates (less than 3 cases per 100,000 people per year) are in countries such as Chile, Mexico, China, and others [47].

The main medical and social problems associated with T1D in childhood and adolescence include reduced life expectancy and the high occurrence of severe disabling complications.

In the Russian Federation, as of December 31, 2016, the total number of T1D patients under 18 was 31,727. From 2013 to 2016, the prevalence of T1D in children ranged from 81.0 to 91.4 per 100,000 children, and in adolescents from 212.8 to 209.5 per 100,000. In 2016, the prevalence of T1D was 14.2 per 100,000 among children and 10.0 per 100,000 among adolescents [49-50].

In the overall structure of diabetes prevalence, Type 1 diabetes accounts for 10-



15%, observed primarily in children under 15 [24, 39]. Among patients under 18, 2-type diabetes accounts for 2 to 17%. The highest prevalence of the disease by age has been recorded in the 5-17 age group in the United States [30, 40].

Epidemiological studies show that the disease rate varies depending on gender, age, ethnicity, urbanization, living area, geographical location, and climate conditions [8, 36, 38, 44, 45].

The distribution of diabetes is not uniform worldwide. In some regions, despite annual changes in the disease's prevalence, the figures have remained nearly constant for a long period [38, 44]. The actual number of patients with diabetes is 4-5 times greater than the registered cases [8].

The prevalence of Type 1 diabetes differs across countries: For example, Finland has the highest incidence rate (35.5 per 100,000 population), while the lowest is reported in Northern Greece (4.6 per 100,000) [42]. This issue is of particular relevance due to the development of early disability in children and adolescents caused by diabetes complications [3, 15, 16, 32]. Severe and life-threatening complications, such as diabetic retinopathy (cataracts and retinopathy), diabetic neuropathy, and diabetic nephropathy, often lead to disability.

Therefore, accelerating the scientific development of child health protection and improving the effectiveness of scientific research should be prioritized as an interdepartmental task [7, 28]. One of the leading social problems is childhood disability. According to several authors, disability should be viewed not only as the limitation of current diseases and social functions but also from the perspective of the deterioration of quality of life. Furthermore, scholars have identified a number of other factors contributing to the emergence of childhood disability: late diagnosis, lack of timely treatment, absence of dispensary services, and others [15, 32, 34, 37].

In the Republic of Kazakhstan, the annual increase in diabetes prevalence ranges from 8% to 12%. The number of patients doubles every 7-8 years [17, 20]. According to R.B. Bazarbekova [2,51], the rapid increase in endocrine diseases in children in Kazakhstan is based on data related to medical consultation, which may not fully reflect the actual situation.

Complications of diabetes are directly linked to the level of glycosylated hemoglobin. Studies indicate that diabetic nephropathy is found in 12-25% of patients, retinopathy in 16-37%, neuropathy in 25-40%, and macropathy of lower extremities in 5-7% of cases [5-7, 24, 32, 34].

One of the most common complications of diabetes in children is kidney damage, which may manifest as the presence of protein and blood cells in the urine, leading to glomerulonephritis and renal failure in severe cases [13]. Diabetic nephropathy (DN) develops in 40-45% of cases, complicating the progression of



both Type 1 and Type 2 diabetes at equal rates. In many countries, diabetic nephropathy is one of the leading causes of chronic renal failure (CRF). The mortality rate from uremia in patients with Type 1 diabetes is higher than in those with Type 2 diabetes, with rates of 50-55% and 5-10%, respectively (WHO, 1992).

The rate of diabetic nephropathy is linked to the age of onset of Type 1 diabetes. The frequency of DN is highest in individuals aged 11 to 20, reaching 44-45%.

Diabetic retinopathy (DR) is a common vascular complication of diabetes, and one of the leading causes of complete vision loss. The danger of this complication is that damage to the diabetic retinal vessels often goes unnoticed for a long period [19]. Studies have shown that in patients with Type 1 diabetes under the age of 30, diabetic retinopathy develops in 89% of those who have had the disease for more than 10 years, and proliferative diabetic retinopathy occurs in 30% of these patients. Research by V.K. Aleksandrova, E.G. Bessmertnaya, and T.M. Milenkaya has shown that inadequate metabolic control and the absence of compensation are responsible for the unfavorable course of diabetic retinopathy.

Among adolescents, the risk factors for Type 1 diabetes include:

Genetic predisposition: Genetics plays a significant role in the development of Type 1 diabetes. If parents or close relatives have the disease, the risk of diabetes in their children increases.

Viral infections: Some viral infections, such as measles, rubella, and others, can trigger autoimmune processes that lead to the development of diabetes.

Immune system and environmental factors: Untimely or incorrect immune responses can also lead to the development of diabetes.

Risk factors for Type 2 diabetes include:

Obesity and poor diet: Excessive calorie intake and consumption of sugary products lead to the development of insulin resistance.

Physical inactivity: A lack of physical activity, especially among adolescents, is one of the main risk factors for Type 2 diabetes.

Family history: If family members have Type 2 diabetes, there is a higher risk of the disease developing in children.

Stress and psychological changes: Hormonal changes and stress, especially during adolescence, can influence the development of diabetes.

Thus, the prevalence of diabetes mellitus is related to gender and age. Type 1 diabetes is most prevalent during the critical periods of growth and hormonal changes in the body. The development of complications due to diabetes contributes to early disability, which has significant medical and social implications. Among the general complications, the development of diabetic nephropathy is particularly important, as it is linked to the duration of the primary disease, especially in



children with Type 1 diabetes.

The proportion of diabetes among endocrine system diseases remains high. In 2003, this indicator was 111.3, and by 2007, it had increased to 129.2 per 10,000 people. Among those initially examined, children with type 1 diabetes are predominant. Diabetic microvascular complications are the leading causes of early disability in children with diabetes. Diabetic nephropathy is observed in 40-45% of patients, retinopathy in 16-37%, neuropathy in 25-40%, and damage to the blood vessels of the lower extremities in 5-7%. In this regard, the strict implementation of the patient management protocol (Order No. 764, December 28, 2007) and, in some cases, conducting a more detailed examination will help improve the quality of care to some extent.

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