A quality of life for patients with diabetes

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Abstract

Introduction and purpose: Diabetes mellitus (DM) is a metabolic disease caused by a chronic state of hyperglycemia, which results from a defect in the function or secretion of endogenous insulin. It is a disease that leads to serious complications such as blindness, lower limb amputation, ischemic heart disease or ischemic strokes. Description of the state of knowledge: The World Health Organization has identified diabetes mellitus as a global epidemic. Between 1980 and 2014, the number of people with diabetes increased from 108 million to over 422. Between 2000 and 2016, more than 7 million deaths from diabetes were reported in 108 countries, but this is an under-number due to the fact that many patients are not diagnosed with diabetes. The prevalence of diabetes in recent years is also higher in low and middle income (LMIC) countries than in high income (HIC) countries. DM also places a significant financial burden on the healthcare budget. Despite relatively large investments in medical care, clinical trials and public health interventions do not reduce the rate of increase in incidence. In the United States, annual healthcare expenditure for people with diabetes is 2.3 times greater than for people without diabetes. Summary: It is well known that diabetes significantly reduces patients' quality of life. It is influenced by both severe complications related to DM and adherence to strict medical recommendations. The low quality of life of diabetic patients contributes to depression, which is associated with not compliance with medical recommendations and increased mortality.

Key words: Diabetes; Mortality; Quality of life

1. Introduction and purpose

1.1 Diabetes epidemiology

Diabetes mellitus (DM) is a metabolic disease characterized by chronic hyperglycemia resulting from impaired insulin function or secretion. It leads to micro and macroangiopathic complications. It is the main cause of blindness, causing dysfunction and failure of organs such as the heart, kidneys and blood vessels. According to the latest data, in recent decades we can observe large increases in the incidence of diabetes both in high-income countries but also in many low and middle-income countries. It is associated with an increase in the need for medical services, with an increase in costs and an increase in the number of acute and chronic diseases associated with diabetes in the general population, which will result in a reduced quality of life for patients.[1] By 2014, the number of people diagnosed with diabetes had increased from 108 million to 422 million in 34 years, while the International Diabetes Federation estimates the population with diabetes to increase to 592 million by 2035. In 2013, approximately two-thirds of all diabetics lived in low- and middle-income (LMIC) regions. The prevalence of diabetes in recent years is also higher in the LMIC than in the high-income (HIC). This is due to rapid urbanization, a change in diet and a less active lifestyle, leading to the most common form of the disease, type 2 diabetes, accounting for approximately 90% of the population affected by diabetes. Research shows that diabetes has a significant economic impact. Contributes to an increased burden on healthcare, increased costs for patients and employers but also leads to a reduction in the productivity of the workforce. In the United States, the cost of diabetes is $ 237 billion in direct medical costs and $ 90 billion in lost productivity. In 2007 and 2012, the annual expenditure for a person with DM is 2.3 times

higher compared to people without diabetes, taking into account age and gender. A significant part of the costs is related to comorbidities and diabetes complications. In 2007 and 2012, the annual expenditure for a person with DM is 2.3 times higher compared to people without diabetes, taking into account age and gender. A significant part of the costs is related to comorbidities and diabetes complications. In 2007 and 2012, the annual expenditure for a person with DM is 2.3 times higher compared to people without diabetes, taking into account age and gender. A significant part of the costs is related to comorbidities and diabetes complications.[2] Recent research shows that type 2 diabetes is a significant economic problem for the population in low-income countries [3] In the years 2000-2016, there was an increase in premature mortality by 5%, while in 2019 alone, the disease led to approximately 1.5 million deaths. According to data from WHO, approximately 8.5% of people aged 18 and older had diabetes in 2014. These numbers show that diabetes is a global problem. [4]

2. **Description of the state of knowledge**

2.1. Type 1 diabetes

Type 1 diabetes mellitus (T1DM) accounts for approximately 10% of all diabetes cases. Its incidence is influenced by ethnic, geographic and seasonal origin. T1DM is a chronic autoimmune disease with a heterogeneous origin characterized by insulin deficiency leading to hyperglycemia. This type of diabetes can be diagnosed at any age, but it is one of the most common chronic diseases in childhood, mainly in children and adolescents. There are two main maturity peaks. The highest peak is between the ages of 5 and 7, while the less frequent is in adolescence, between the ages of 16 and 19. According to studies, the prevalence of T1DM in the world is steadily increasing at a rate of about 3% annually. There are confirmed studies pointing to the genetic determinants of T1DM. It follows from them,The problem is that relatively often there is no person suffering from diabetes in the family, which makes it difficult to attempt primary prophylaxis of this disease. [5]

According to scientific research, the autoimmune process leading to pancreatic β-cells destruction has the main influence in the pathogenesis of type 1 diabetes which are responsible for the production of insulin. Impaired insulin production may begin more than 2 years after a correctly diagnosed diagnosis, while a decrease in insulin secretion may continue for years after diagnosis, to the point where it is absent or negligible. With the progression of T1DM, there are significant fluctuations in the level of glycaemia, which facilitates the diagnosis of the disease.[6] Compared to previous decades, the life expectancy of patients with type 1 diabetes has increased significantly due to easier diagnosis and greater availability of exogenous insulin.[7]

2.2 Type 2 diabetes

A high-energy diet with a sedentary lifestyle is widely believed to contribute to the development of type 2 diabetes (T2DM). These are the two main reasons that led to the global obesity epidemic that increases the risk of developing T2DM. In the years 1980-2014, after taking into account the impact of population aging, the number of people burdened with type 2 diabetes almost doubled. The increase in the diseased population has occurred in most countries, but has been most noticeable in low- and middle-income countries.[8] The prevalence of T2DM is estimated at over 400 million people worldwide. According to studies, with the current upward trend in 2050, the incidence of type 2 diabetes in the United States will affect almost every third person. T2DM is a metabolic disease with a complex

pathophysiology consisting of genetic and environmental factors. Chronic hyperglycemia leading to diabetes develops as a result of pancreatic islet failure which causes pancreatic β-cells dysfunctions with increased production of glucagon, which leads to insulin resistance, which manifests itself mainly at the level of the liver, skeletal muscles and adipose tissue. [9]

2.3 Diabetes diagnosis

Diabetes is one of the most common diagnoses given by GPs. Undiagnosed and uncontrolled, it is the main cause of blindness in adults, leading to cardiovascular failure, kidney failure or amputation of the lower limbs as a result of a diabetic foot. Population screening can lead to early diagnosis, which reduces the risk of severe diabetes complications and would significantly reduce health care costs. The diagnosis of diabetes mellitus can be made with duplicate fasting blood glucose measurements ≥126mg/dl on two different days; after oral glucose tolerance test (OGTT) when 120 min. oral glucose tolerance test (OGTT) has a glucose level of ≥200 mg/dl; in casual glycemia ≥200mg/dl with the typical triad of diabetes symptoms: polydipsia, polyphagia, polyuria; in random blood glucose ≥200 mg/dl and single blood glucose ≥126 mg/dl in fasting patients without typical symptoms of diabetes.[10]

2.4 Diabetes complications

Currently, over 422 million people suffer from diabetes. According to estimates, almost half of patients are unaware of their disease, which increases the risk of developing diabetic complications. The problem is global, because in 2015 alone, more than 12% of global health expenditure was spent on patients with diabetes, but there were still around 5 million deaths associated with this disease. [11] Pathological changes in diabetic patients occur mainly in the circulatory system, leading to both microvascular and microvascular complications. The most serious microvascular changes include diabetic retinopathy and diabetic nephropathy. The most common cause of blindness in adults in developed countries is diabetic retinopathy. As a result of chronic hyperglycemia, the blood vessels of the retina are damaged, which leads to its ischemia and the proliferation of new vessels. According to the United Kingdom Prospective Diabetes Study (UKPDS), up to 40% of T2DM patients have diabetic retinopathy at diagnosis. The duration of diabetes, along with the control of glycaemia and blood pressure, has a significant impact on the risk of developing and exacerbating diabetic changes. Glomerular damage in diabetic nephropathy usually results from the correlation of chronic hyperglycemia with hypertension. There is a thickening of the basement membrane, interstitial fibrosis and atherosclerosis. Primarily, glomerular hyperfiltration occurs, eventually leading to renal failure. According to studies, 30-40% of patients develop diabetic nephropathy within 25 years of the diabetic population.[12] The macrovascular complications in T2DM include coronary artery disease, arrhythmias, cardiomyopathies, and diseases of the cerebral and peripheral arteries. Cardiovascular and cerebrovascular complications are still the most common causes of death in diabetic patients, while in most cases there are also diseases such as obesity, hypertension and dyslipidemia.[13] According to studies, type 2 diabetes increases the risk of coronary heart disease by 2-4 times. Diabetes-related cardiovascular diseases, besides having the greatest impact on patient mortality, have the largest share in the direct and indirect healthcare expenditure on diabetes. [14]

2.5. Quality of life

It is well known that diabetes affects the lives of patients. People with DM have a significantly reduced level of quality of life. With patients burdened with comorbidities and diabetic complications, the quality of life index (QoL) decreases drastically. [15] Diabetes mellitus is an incurable disease that requires both drug therapy and glycemic control, an active lifestyle and a diabetic diet. The problems of people with DM relate primarily to a restrictive treatment regimen for the rest of their lives, fear of multiple complications, and a difficult social life. Changes in behavior patterns affect the mental state of patients, which contributes to the poor quality of life of patients with diabetes. This often leads to depression, which is associated with an inappropriate approach to treatment and increased morbidity and mortality.[16] In a study by Solli et al.[17] Patients without complications in T1DM had healt-related quality of life (HRQoL) of 0.90 and in T2DM of 0.85. The presence of only one complication has already reduced the results to 0.76 and 0.80, respectively. Increasing the number of complications from diabetes to≥ 2led to the results of 0.55 and 0.64, respectively. HRQoL indicator. [18] According to research, people with diabetes have a reduced HRQoL compared to people without diabetes in the same age range. [19] This index decreases with the development of the disease and the increase in the number of diabetic complications.[20] In Norwegian studies by Solli et al. For T1DM, the following diseases had a negative impact on the EQ-5D index: diabetic neuropathy (-0.358), ischemic stroke (-0.291) and ischemic heart disease (-0.181). In type 2 diabetes, EQ-5D was negatively affected by diabetic neuropathy (-0.187), stroke (-0.135), fear of hypoglycemia (-0.078).[21] According to the research, older patients with diabetes, despite greater physical limitations, show better social functioning in specific measures than young people. They report less emotional stress associated with diabetes and a relatively better ability to cope with DM.[22]

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