Issues of Type 2 Diabetes Disease Effective Treatment in Kazakhstan

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Abstract: In his address to the people, the First President of our country, emphasized the need to introduce innovative methods of treating socially significant diseases. Among these diseases, diabetes holds a special position.

More than 14,000 new cases of diabetes mellitus are officially detected annually in Kazakhstan.

The real picture of the disease is difficult to compare with these data. This review discusses the prevalence of type 2 diabetes among the population of the Republic of Kazakhstan, and the causing factors such as age, race, genetic predisposition (OR = 3), obesity, glucose level and total cholesterol etc.

It was found that the main complications and concomitant diseases of diabetes in residents of different regions are polyneuropathy - 22.4%, diabetic retinopathy - 14%, diabetic foot syndrome - 13.6%, arterial hypertension - 13.6% and coronary heart disease (CHD) - 14.4%. Only 1.8% of the population is diagnosed with type 2 diabetes, latent manifestations of type 2 diabetes mellitus, one in four people in Kazakhstan can be sick, 38% of adults aged 20-79 suffer from prediabetes, and 8.2% with diabetes. It is believed that by 2030 in Kazakhstan, there may be about a million patients with diabetes.

Diabetes mellitus, in accordance with the Code of the Republic of Kazakhstan "On the health of the people and the health care system" belongs to the category of socially significant diseases.

Therefore, the study of type 2 diabetes is one of the urgent problems of the public health in Kazakhstan.

Keywords: Type 2 diabetes mellitus, cardiovascular system, coronary artery disease, insulin resistance, overweight, obesity.

INTRODUCTION

Diabetes mellitus is a whole group of diseases that can not be treated only with tablets and injections. There should be a systematic approach from special nutrition for diabetes (diet) to well-thought treatment regimens.

Type 2 diabetes is a common, noncommunicable disease. It can affect both men and women, most often over the age of 40 years.

The danger of type 2 diabetes is underestimated by many, and some patients, in fact, are simply not informed about te disease. And those patients who are aware of their pathology often do not even suspect that it is dangerous, that type 2 diabetes can take severe forms and lead to life-threatening conditions. In addition, many patients do not know that adequate treatment and proper nutrition for type 2 diabetes that can stop the development of the disease.

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RESEARCH BACKGROUND

Diabetes mellitus is one of the most common diseases characterized by a tendency to grow steady. So, according to the International Diabetes Federation (IDF), today in the world, one out of 11 people suffers from diabetes, which in absolute terms is 415 million. By 2040, the number of patients will increase to 642 million (every 10 people). Mortality associated with diabetes is steadily increasing. Every year an increasing number of people fall ill with diabetes, and to date, 8.5% of the adult population suffer from this disease [1]. Such a rapid growth in the prevalence of type 2 diabetes mellitus, as well as the consequences of its complications and concomitant diseases, represent the most serious threat to public health today. In order to better understand the global nature of the incidence of diabetes mellitus, earlier in the framework of international cooperation, registers of different countries have already been evaluated [2-3].

However, the results of this collaboration were rather limited due to the lack of standardized data collection procedures. According to IDF, the prevalence of diabetes in Kazakhstan among adults is estimated at

717,500 cases, or 6.2% [4]. At the same time, according to the Kazakhstan National Register, at the end of 2015 diabetes mellitus was registered in 272,484 adults [5], which is 1.54% of the population, of which 257 989 (94.68%) people had type 2 diabetes. Such significant differences between the data presented by IDF and the information on actually registered patients are a source of serious concern for medical specialists of the Republic [6]. According to the World Health Organization, in Kazakhstan, 11.5% of the population suffers from diabetes [7].

PROBLEM STATEMENT

Diabetes mellitus is the most common human endocrine disease, which is characterized by a complex of disorders in the secretion and functions of insulin, glucose productivity, etc. This disease is the main cause of renal failure, blindness, amputation of the lower extremities and the main factor in the development of cardiovascular diseases. According to the national registry of the Republic of Kazakhstan for patients with diabetes mellitus, by the end of 2017, about 309 thousand people with this diagnosis were registered in Kazakhstan, of which about 2700 were children. The number is growing every year, by 2030 the number of people with diabetes in the country can reach 1 million.

In 50% of patients with diabetes, the disease was skipped at the recognition stage. The question is that prediabetes does not have clinical symptoms. The factor of genetics is important among first-born relatives. Knowing this factor, people should think that in a family history if there is a patient with diabetes then they fall into a risk factor. The second point is nutrition. Thirdly, 39% of us have physical inactivity. The lifestyle

has changed so much that inactivity haunts us everywhere. Fourth, the age; people over the age of 40 are more prone to diabetes.

The main reason for the appearance of type 2 diabetes is insulin resistance, that is, a significant decrease in the sensitivity of body cells to the effects of insulin. Violations occur in the early stages of the development of the disease. At the molecular level, numerous defects in insulin signaling affect insulin resistance, decrease the number of insulin receptors, receptor kinase activity, phosphorylation of intracellular substrates, and affect translocation and activation of the glucose transporter [8].

Most metabolic and anti-apoptotic effects of insulin are mediated by a signaling pathway that is transmitted through the membrane receptor. The signaling pathway includes the phosphorylation of insulin receptor substrate proteins (activation of insulin receptor substrate), activation of phosphatidylinositol-3-kinase (PI3 kinase) and protein kinases B (PKB or Akt) [9].

LITERATURE (DATA) REVIEW

Along with the growth of the disease and the development of severe complications, the costs of providing medical care and rehabilitation of patients with diabetes are increasing, especially among people of working age [10]. So, according to the International Diabetes Federation, global healthcare costs for the treatment of diabetes by 2040 will increase by 19%, while the highest healthcare costs for the treatment of diabetes (2015) are set in countries such as the USA - 320 billion, China - 51 billion, Germany - 35 billion, Japan - 29 billion US dollars [11]. Today, diabetes costs in the Republic of Kazakhstan amount to 24
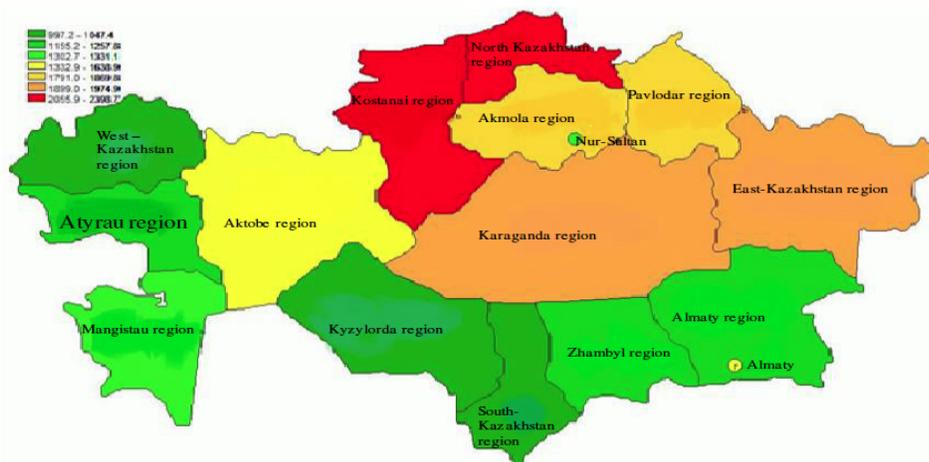
Figure 1: The incidence of the population of the Republic of Kazakhstan of type 2 diabetes mellitus in 2015 (per 100 thousand population).

billion tenge (75 million US dollars) [12]. The incidence rate of type 2 diabetes mellitus recorded in 2015 in the Republic amounted to 1473.6 cases per 100 thousand people (Figure **1**).

According to the general indicator, the highest incidence rates are recorded in North Kazakhstan – 2398.7, Kostanai –– 2055.9, East Kazakhstan – 1974.9 oblasts, and the lowest incidence rates are observed in West Kazakhstan –– 1047.4, South –– Kazakhstan - 1025.0 and Kyzylorda - 997.2 regions. In the North Kazakhstan, Kostanay, East Kazakhstan and Karaganda regions, the incidence of type 2 diabetes among women is 2.3 times higher than among men (Table **1**). The incidence of women with type 2 diabetes is 1.7 times higher in the West Kazakhstan region, and 1.3 times higher in the South Kazakhstan and Kyzylorda regions [13].

The high social significance of diabetes in the Republic made it necessary to adopt a number of legislative documents: screening for the early detection of diabetes according to the Order of the Minister of Health of the Republic of Kazakhstan No. 145 of March 16, 2011 [14], and the implementation of a program for the management of chronic noncommunicable diseases in pilot regions according to the Order of the Minister of Health of the Republic of Kazakhstan No. 211 dated April 5, 2013 and Order of the Minister of Health and Social Development of the Republic of Kazakhstan No. 203 dated March 15, 2016 "On some issues of managing chronic noncommunicable diseases in the framework of the pilot project" [15,16].

DISCUSSION

Type 2 diabetes mellitus is caused by a relative deficiency in the blood of insulin - a condition where the insulin protein produced by the pancreas becomes inaccessible to insulin receptors located on cell membranes. As a result, cells are deprived of the ability to metabolize sugar (glucose), which leads to a lack of glucose supply to the cells, and also, which is no less dangerous, to the accumulation of glucose in the blood and its deposition in various tissues. According to this criterion, non-insulin-dependent diabetes mellitus is different from type 1 diabetes mellitus, in which the pancreas does not produce enough insulin.

Note that more than 5 million people die from diabetes annually in the world, this is the third cause of mortality after cardiovascular and oncological diseases. Type 2 diabetes is one of the main causes of blindness, renal failure, heart attacks, strokes and

Table 1: The Incidence of the Population of the Republic of Kazakhstan of Type 2 Diabetes Mellitus by Sex Per 100 Thousand Population in 2015

Region	Absolute	men	women	
		per 100 thousand.	Absolute	per 100 thousand.
Akmola region	3932	1099,0	9330	2437,7
Aktobe region	4159	1038,8	6886	1607,9
Almaty region	8171	858,0	15653	1593,2
Almaty	8675	1133,9	18743	2064,6
Nur-Sultan	4001	961,4	7238	1620,7
Atyrau region	2766	957,4	4027	1346,3
East-Kazakhstan region	8042	1210,2	19519	2670,0
Zhambyl region	5038	929,2	8859	1574,5
West – Kazakhstan region	2333	762,3	4301	1313,9
Karaganda region	7236	1107,0	19001	2610,3
Kostanai region	5233	1254,2	12911	2774,7
Kyzylorda region	3282	865,0	4288	1129,2
Mangistau region	3772	1229,4	4439	1431,8
Pavlodar region	4210	1178,6	9947	2487,3
North Kazakhstan region	3870	1422,4	9817	3288,4
South-Kazakhstan region	12268	877,0	16585	1171,2
Republic of Kazakhstan	86988	1026,0	171544	1892,2

amputations of the lower extremities. However, already at the stage of prediabetes in humans, the risk of developing cardiovascular diseases increases by 90%, stroke increases by 2 times, death by 60% and retinopathy (damage to the vessels of the retina of the eyeball) increases by 2 times.

Type 2 diabetes is accompanied by normal or increased production of insulin. The reason for the development of the disease is the untimely intake of insulin in the blood, as well as a decrease in the sensitivity of the patient's body cells to insulin. In type 2 diabetes mellitus, insulin in the blood is usually enough, but the cells "don't feel" it, and glucose cannot enter the cells from the blood. Insulin deficiency is not quantitative (lack of insulin production), but qualitative (insufficient insulin effect). Even with sufficient or elevated concentrations of insulin in the blood, it does not work well. The reasons for the poor effectiveness of insulin can be various. In patients, the sensitivity of receptors on the surface of cells to insulin is lost. The cells in the body lose their ability to bind insulin to their surface receptors, as these receptors are damaged. Insulin cannot activate receptors on the surface of cells, and those, in turn, cannot activate the mechanism of absorption of glucose into the cell. Often this type of diabetes mellitus type 2 is called "thick diabetes," because it is more common in patients with increased body weight. If defective insulin is produced, it is not suitable for normally formed receptors.

In this case, the receptors on the cell surface are perfectly normal but insulin cannot contact them because it has the wrong structure. This form of type 2 diabetes is called "lean diabetes." Gestational diabetes also happens. This is a rare, temporary type that develops exclusively during pregnancy and disappears with its end. The development of the disease can be considered an individual reaction of the body: the produced hormones block the perception of insulin by the cells of the expectant mother. In some cases, the pancreas simply cannot cope with the double production of insulin, the result is gestational diabetes. Risk factors are late parturient age, smoking, overweight and heredity.

According to experts, at least 25% of people with diabetes do not know about their disease. There is a complex of symptoms characteristic of both types of diabetes. This is frequent urination and a feeling of unquenchable thirst, rapid weight loss, often with good appetite, a feeling of weakness or fatigue, rapid fatigue, blurred vision, decreased sexual activity, potency,

numbness and tingling in the limbs, a feeling of heaviness in the legs, dizziness, a protracted course of infectious diseases, slow healing of wounds, a drop in body temperature below the average, and cramps of the calf muscles.

Undetected diabetes in time, inadequate treatment or inadequate glycemic control are the reasons for the development of serious disabling and life-threatening complications in patients - myocardial infarction, cerebral stroke, blindness, renal failure and amputations of the lower extremities. Moreover, despite the fact that these complications are considered to be the result of chronic hyperglycemia, other factors, such as a long history of diabetes, high blood pressure, smoking, dyslipoproteinemia, obesity and others, play an important role in worsening the prognosis of the disease [17]. Complications of diabetes mellitus in a large number of cases lead to the development of disability, reduce the quality of life and are one of the main causes of death among this category of patients [18].

In patients with diabetes, the risk of developing cardiovascular disease is two times higher compared with people of the same age and gender, but without this disease [19]. Moreover, it is cardiovascular disease that is the leading cause of death in patients with diabetes mellitus compared with the general population, especially among women [20,21]. In addition, most patients with type 2 diabetes have chronic diseases that make it difficult to influence the prognosis of diabetes [22,23].

Difficulties in managing the risks of developing complications of diabetes mellitus, especially in elderly patients, are confirmed by the fact that such patients have a high percentage of complications, despite sufficient glycemic control [24].

Providing medical care to patients with complications of diabetes requires significant costs from the health care system, the most costly of which are specialist consultations, outpatient care, emergency care costs, prescription drugs, laboratory and diagnostic tests, as well as direct hospitalization [25.26].

According to the National Register of Patients with Diabetes in Kazakhstan, as of June 2016, 281,294 patients with diabetes were registered (1.5% of the average annual population), of which 278,716 were adults, and type 2 diabetes was registered in 93% of the total number of patients with this disease [27].

The main age group of patients with type 2 diabetes is people over 40 years old with concomitant obesity, arterial hypertension and other cardiovascular diseases that create an unfavorable comorbid background for type 2 diabetes, worsening the prognosis of the disease and increasing the likelihood of disability in this category of patients. In general, control of risk factors allows to a certain extent to improve the prognosis for complications of diabetes. For example, smoking cessation is an important measure aimed at the prevention of macrovascular complications as it reduces the development of microvascular lesions and facilitates glycemic control [28]. But, although cardiovascular diseases remain the main cause of high mortality in patients with type 2 diabetes, large-scale studies have still not clearly determined whether intensive glycemic control has advantages over the traditional approach in terms of reducing cardiovascular mortality in this disease, as demonstrated in a number of studies [29-31].

However, morbidity and mortality in diabetes mellitus can be reduced by secondary preventive measures, regular screening, and timely referral to specialists [32]. The data provided by the Organization for Economic Co-operation and Development (OECD) for diabetes mellitus show indicators of the prevalence of diabetes among people aged 20-79 in individual OECD countries, while Kazakhstan does not have data on the actual prevalence of diabetes among the population, the studies do not correspond with the epidemiological features, which makes it impossible to represent them in international databases.

The organization of the healthcare system of the Republic of Kazakhstan in many ways is similar to the OECD countries, however, the average life expectancy at birth is 8 years behind the average of developed countries. The main sector of the provision of medical services in the Republic of Kazakhstan is a hospital, while the level of hospitalization for diseases like asthma and diabetes is increasing, although people with these diseases can be treated as outpatients (ZPAL). Despite the ongoing reforms in the field for ensuring the quality and efficiency of the services provided, its implementation at all levels is not carried out and is improperly controlled due to the lack of reliable data and an undeveloped information system. The experience of studying in different countries shows the lack of adherence of patients to treatment, primary care physicians do not rationally use medicines and the principle of free medicines for the patients leads to a lack of interaction between the doctor and the patient,

while patients do not participate in the treatment process [33].

Diabetes mellitus is a socially significant disease and the study of effective disease control, experience on the example of individual countries of the organization of economic cooperation and development at the level of primary health care can be useful for the formation of optimal policies, targeted programs and the rational allocation of financial resources. Many countries have their own policies for the management of type 2 diabetes and there are certain approaches, and the selection, differentiation and adoption of those positive key priorities from them will improve the quality and continuity of care in the primary care.

Diabetes mellitus is a chronic, non-infectious and lifelong managed disease in an outpatient setting [34]. Most patients with type 2 diabetes mellitus are observed in the primary care settings by therapists and endocrinologists. According to 86.7% of therapists, the number of patients with diabetes exceeds the number of registered ones and determining the level of blood glucose in the daily practice of therapists will reveal most of them.

Most of the doctors surveyed believe that they experience difficulties in servicing patients due to the presence of concomitant diseases, low patient adherence and a narrow choice of drugs for treatment. According to doctors of various specialties (endocrinologists, cardiologists, neuropathologists, oculists), when examining patients with type 2 diabetes, complications from the cardiovascular system, nervous system and organ of vision are revealed.

CONCLUSION

Thus, according to the literature data in the regions of the country, there is an uneven distribution of the incidence of type 2 diabetes mellitus. A higher incidence rate is found among women. In connection with the current situation, along with the costs, the economic significance of the problem of diabetes is emphasized by the fact that a high prevalence of diabetes incurs huge work losses. An increase in the incidence and life expectancy of patients with diabetes leads to an increase in the number of patients, including those with chronic complications of the disease, requiring specialized medical care. The existing difference between the statistical indicators of the prevalence of diabetes in the country and in the world determines the need for targeted research to

identify a true and detailed picture of the prevalence of pathology, which would be used as a scientific basis for planning appropriate health, medical and preventive measures.

Given the magnitude of the problem, which is type 2 diabetes and its complications for society as a whole, further study of the organization of the combined work of specialists such as endocrinologists, oculists, neuropathologists and cardiologists to solve one problem, i.e., improving the health of patients with type 2 diabetes is required. The successful implementation of the diabetes screening program and the management of chronic non-communicable diseases in the country will reduce the medical and social significance of this problem and find optimal solutions to these problems.

According to the results of the study, it can be concluded that doctors of various specialties have difficulties counseling patients with type 2 diabetes and this situation is associated with the presence of complications in patients and insufficient knowledge of the specialists. The situation is complicated by the fact that in some clinics there are no necessary specialists. In order to increase the level of care provided, patients should be sent to continuing education courses for therapists and doctors of various specialties (endocrinologists, cardiologists, neuropathologists, oculists).

The organization of outpatient care for patients with type 2 diabetes mellitus by therapists, cardiologists, neuropathologists and oculists should be interconnected, based on the continuity and an interdisciplinary approach, aimed at ensuring patient satisfaction with the quality of medical care provided, adherence to treatment and improving the quality of life.

Thus, the national diabetes control program is a systematic and coordinated approach aimed at improving the organization, accessibility and quality of diabetes prevention and treatment, the whole range of problems from primary prevention to treatment and palliative care, resources, services and systems that support prevention and treatment.

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