

# State of patients' knowledge about treatment and proceedings in type 2 diabetes

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## Abstract

**Objective.** The aim of the research was to evaluate the level of patients' knowledge about type 2 diabetes, treatment and proceedings in the case of the disease.

**Materials and method.** 100 patients suffering from type 2 diabetes were included in the research, aged 40–90 years (64% and 36%), who lived in the countryside (54%) and in the city (46%), hospitalized in the internal and geriatric wards in provincial hospitals of the Podkarpacie Region in south-eastern Poland. The research method was a diagnostic survey conducted by use of a questionnaire that consisted of 31 both multiple choice and open questions. Among the respondents, 64% were women and 36% men. Among them, 18% were aged from 40–50, 20% aged from 51–60, 28% from 61–70, 24% from 71–80-years-old, and 10% of respondents were aged over 80. Among the examined, 12% were treated only by diet, 24% by insulin, 18% by insulin and diet.

**Results.** From among respondents cured by insulin, 52% of them administered their own injections, 36% had the injections administered by a family member, and 12% had the injections administered by a nurse. From among the patients, 70% knew the symptoms of hypo- and hyperglycaemia, 84% knew how to react in the case of hypoglycaemia, but only 56% knew how to react in the case of hyperglycaemia. From among respondents, 68% controlled the skin of the feet.

**Conclusions.** Over a half of the respondents (70%) know the symptoms of diabetes and mentioned frequent urination (77%) and increased thirst (65%), but 30% had no knowledge of the symptoms of diabetes. The state of the patients' knowledge about different complications of the disease was insufficient.

## Key words

diabetes mellitus, knowledge level, questionnaire

## INTRODUCTION

Diabetes is a chronic metabolic disease characterized by increased blood glucose level which is a result of defective production or use of insulin. The disease is also defined as a metabolic syndrome caused by abnormal carbohydrate metabolism that affects many organs and systems such as eyes, kidneys, heart, nervous system, blood vessels [1].

During recent years, an alarming increase has been noted of the incidence of diabetes and other non-infectious chronic diseases (obesity, cardiovascular diseases, cancer, osteoporosis). According to estimates, about 58 million people die due to cardiovascular diseases such as heart attack or stroke every year, and diabetes and high blood pressure are the main risk factors for death from these disease. Diabetes is favourable to development of atherosclerosis changes in vessels. Risk of heart attack in men suffering from diabetes is by 50% higher when compared to general population rates, while in women – by 150% higher. Also, the risk of stroke in people with diabetes is from 2–8 times greater. If a person suffers from both diabetes and high blood pressure, the risk for stroke may be even 12 times greater. Diabetes is closely connected with numerous adverse factors. Those that contribute to occurrence of diabetes are genetic predisposition, age, environmental factors (obesity, low physical activity), among others. A significant increase

in the incidence of diabetes occurs in the age bracket of 40–70 years [2, 3].

Type 2 diabetes accounts for 85–90% of all diagnosed cases, while 50% are detected too late. The World Health Organization (WHO) has identified diabetes as a pandemic disease of 21st century. According to the prognoses, the percentage of the sick will increase from 6.6% up to 7.7%; furthermore, the downward trend in the age-standardised incidence of type 2 diabetes will also intensify. It is estimated that in Poland about 2.7 million people aged 20–79 suffer from diabetes, i.e. 9.30% of the adult population, a percentage that is quite high when compared to other European countries. According to estimates by the Ministry of Health, 4 million people live with symptoms indicating the possibility of developing diabetes [4, 5].

Increase in incidence of type 2 diabetes is so dynamic that, according to estimates, in 2013, 366 million people will suffer from the disease, which is an increase of 189 million more than in 2000 (177 million). Increase in the incidence of type 2 diabetes is closely connected with the increase in the incidence of overweight and obesity. 90% of patients suffering from type 2 diabetes are said to have incorrect body weight. Currently, about 197 million people worldwide have impaired glucose tolerance and in the majority of cases, obesity and metabolic syndrome are the cause of this disorder. Scientific prognoses on diabetes are very unfavourable. According to estimates, by 2025 the number of people suffering from impaired glucose tolerance will increase up to 420 million. In Poland, just as in other countries, the epidemiological situation is bad. According to estimates, although 2 million

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people suffer from type 2 diabetes, 40 % of cases remain undiagnosed. It is also estimated that about 4 million people suffer from pre-diabetes. The diabetes incidence rate in Poland is about 4.4% (2000), which is higher than the average world diabetes incidence rate (2.8%). As proved by research, the dynamics of the diabetes incidence increase in Poland is very high. According to estimates, in 2030, 10% of people will suffer from diabetes in Poland (8% in the world) [1, 6, 7, 8].

Thanks to the present level of knowledge on diabetes and access to increasingly better treatment methods it is possible to significantly decrease the disease severity, reduce early and late complications, as well as significantly improve the quality of life of the patients. One of the essential conditions for effective treatment is the best possible cooperation of the patients, development of the habit of self-control and self-care which, to a great extent, depends on education [9, 10, 11, 12].

**Objective.** The purpose of the study was to determine the level of knowledge on treatment and proceeding in diabetes among patients suffering from type 2 diabetes.

## MATERIALS AND METHOD

The research involved 100 patients aged 40–90 suffering from type 2 diabetes. The research group consisted of 64% women and 36% men; 54% from rural areas and 46% from urban areas, who were hospitalized in internal and geriatric wards in hospitals in the Podkarpackie Region in south-eastern Poland.

In order to obtain the research material, a standardized questionnaire was applied which included questions both to spontaneous and prompted answers. All the statistical calculations were performed by using the data analysis software system STATISTICA (developed by StatSoft, Inc. [2011], version 10.0. [www.statsoft.com](http://www.statsoft.com)), statistical package R (version 2.15.1), and Microsoft Excel spreadsheet. Quantitative variables were characterised by arithmetic mean, standard deviation, median, minimum and maximum value (range), and 95% confidence interval (CI). Qualitative variables have been presented by use of cardinality and percentage value. In statistical analysis, the following tests were applied: Shapiro-Wilk, Levene, Brown-Forsythe, Student's t-distribution, Mann-Whitney U, ANOVA F-test, and Kruskal-Wallis.

## RESULTS

The surveyed group consisted of 64% women and 36% men. 18% were aged 40–50, 20% were aged 51–60, 28% aged 61–70, 24% aged 71–80, and 10% were aged over 80. More than half of the surveyed (54%) lived in rural areas, while 46% in a city. Among the surveyed group, 36% had primary education, 24% had vocational education, 26% secondary education, and 14% – higher education. 18% of the surveyed had suffered from type 2 diabetes for less than a year, 58% 1–5 years, 16% – 6–10 years, and only 8% had suffered from diabetes more than 10 years. Among the surveyed group, 12% cured themselves only by a diet, 24% with insulin, 18% both with insulin and diet, 22% with pills and diet, 8% with insulin and pills, and 16% with pills only. As far as patients cured with insulin are concerned, 52% administered the injections

themselves, 36% were given injections by a family member, while 12% were given injections by a visiting nurse.

The most frequent parts of the body injected with insulin were the arms – 86%, abdomen – 64%, thighs – 48%, and buttocks – 34%. The least frequent part of the body injected with insulin was the area of shoulder bone – only 8%.

Among the surveyed group, 70% were familiar with the symptoms of diabetes, of which the most frequently mentioned were: frequent urination (77%), increased thirst (65%), blurred vision (51%), dry mouth (40%), and weight loss (23%).

Late diabetic complications most frequently mentioned by the surveyed were diabetic foot (84%), blurred vision (68%), kidney impairment (52%), blindness (36%), and stroke (13%).

As many as 80% of the surveyed stated that they did not smoke, while 20% were smokers. 72% suffered from high blood pressure and 66% monitored their blood pressure regularly, while 34% did not control it at all. 74% of the surveyed were overweight, only 34% monitored their body weight, while the remaining 66% did not control it at all. 82% of the respondents knew which products should be eliminated from their diet, the remaining 18% needed to develop their knowledge. When asked about the purpose of a diabetic diet, the respondents mentioned: maintaining proper blood sugar level (100%), preventing atherosclerosis and cardiovascular diseases (86%), maintaining a proper body weight (74%) and preventing early and late complications (52%). Among the surveyed, 84% knew how to react in the case of hypoglycaemia and 86% know the symptoms of hypoglycaemia, of which the most frequently mentioned were: extreme hunger (97%), headache (88%), cold sweats (60%), increased emotions, excitement (48%), and loss of consciousness (23%).

According to the surveyed, hypoglycaemia is caused by delaying or omitting a meal; all the surveyed thought that hypoglycaemia is caused by a too high dose of insulin or medicines, 32% mentioned too intense physical activity, and 16% – alcohol.

Among the surveyed, only 56% knew how to react in the case of hyperglycaemia and 44% needed to develop their knowledge. Only 66% of respondents were familiar with the symptoms of hyperglycaemia, of which the most frequently mentioned symptoms were: frequent urination (78%), increased thirst (66%), dry mouth (51%), and tiredness (27%).

According to 94% of the respondents, hyperglycaemia is caused by omitting injection or by a too small dose of insulin; according to 14% it is caused by low physical activity, 42% mentioned a too large quantity of carbohydrates in a meal, while only 10% thought that hyperglycaemia is caused by disease, infection or fever.

When asked if they know what a diabetic foot syndrome is, 66% of the respondents replied affirmatively, while the remaining 34% negatively. According to 68% of the surveyed, proper foot care is important for patients suffering from diabetes, while 6% claim that it is not. Among the respondents, 68% monitor their foot skin condition. In the surveyed group, diabetic foot syndrome had developed only in 8%. When asked about foot care principles that prevent diabetic foot syndrome, the respondents listed: everyday checking of the foot condition (96%), consulting a doctor in the case of a foot injury (58%), wearing loose, leather shoes and cotton socks (88%), washing feet in hot water (4%), and lubricating dry skin, omitting any injuries (32%).

Among 36% of the surveyed, the disease had led to visual impairment; 50% had not experienced any changes, while 14% did not know if their sight had deteriorated since the disease had occurred.

More than a half of the respondents (60%) consulted an ophthalmologist, which includes 35% who attended at least every six months, 42% once a year, and 23% every two years.

When diagnosed with diabetes, respondents acquired all the necessary information from their doctor, nurse (94%), leaflets, brochures, books (58%), from family, friends (24%) and the Internet (34%).

## DISCUSSION

Diabetes is a social disease, also classified as a civilization disease. The results of epidemiological studies show the systematic increase in the number of cases of this disease within the last decade. The twilight of 20th century was described as diabetes epidemic. This disease comes in sixth in terms of frequency of causes of death worldwide – in 2000, it caused 5 million deaths [13].

In Poland, the diabetes prevalence rate exceeds 9%. Type 2 diabetes accounts for about 85–90% of all cases of diabetes. The standardized incidence rate for type 2 diabetes among the entire Polish population is 5.37% and shows a continuous upward trend. The prevalence rate is 4–7% among the urban population and 2–4% for the remainder of the Polish population [14, 15, 16].

Diabetes is one of the serious problems of contemporary medicine. The number of people suffering from diabetes is still increasing and in industrialized countries it reaches epidemic levels, while in developing countries the incidence of the disease increases dynamically. This results from change in life style, decreased physical activity and increase of calories consumed, which all lead to overweight and obesity. According to the latest data collected by International Diabetes Federation, the average diabetes incidence among adults in European Union (EU) has increased from 7.6% in 2003 to as many as 8.6% in 2006, which means a total of 31 million of patients. According to the prognosis by the WHO, during the period 1995–2025 the number of people with diabetes in economically and socially developed countries will increase by 42%, while in developing countries, including Poland, by 170%. These numbers indicate an unusual character of the problem of diabetes, the need for early diagnostics and prevention of diabetic complications. In 1980, a report by the WHO Experts Committee was published which also summarized the health complications caused by diabetes. The conclusion was that the mortality rate was 2–3 times higher than in whole population, blindness was observed 10 times more frequently, and amputation of a foot due to gangrene 20 times more frequently. Furthermore, in diabetic people there was also observed an increased incidence of complications of atherosclerosis, ischaemic heart disease, stroke and frequent kidney failure [17, 18, 19, 20].

According to the research, 72% of respondents suffered from high blood pressure, 36% have experienced sight impairment, and a diabetic foot syndrome developed in 8% of the surveyed. As the research showed, the respondents were aware of the complications that diabetes may bring. The most frequently mentioned late complications were diabetic

foot (84%), visual impairment (68%), kidney impairment (52%), blindness (36%), and stroke (13%).

Similar results were obtained by Ławska et al. (2004), according to whom the majority of respondents (85.3%) were aware of the threats that diabetes may bring. An essential condition for the treatment of type 2 diabetes, together with a rational diet and pharmacotherapy, was a regular monitoring of one's health, which contributes to regulation of the glucose level and prevents complications that may occur through diabetes. This is possible thanks to education which is a part of the treatment process [9].

Information reflecting the level of knowledge among diabetic patients about their disease and abilities to self-monitor was published for the first time by Majkowska et al. (2001). The study presented the results of research conducted among 120 diabetic patients. The results obtained proved that people are not aware of the threats that diabetes may bring. Kidney failure was mentioned by 32% of the researched, diabetic foot disease by 42%, 30% of the diabetics monitored their blood glucose level, 32% knew the correct postprandial glucose level, and 47% were able to list causes of hypoglycaemia. In the surveyed population, 82% did not know the concept of glycated haemoglobin (HbA1c). The patients acquired information on diabetes from internists, less frequently from nurses or diabetologists, sometimes from brochures and magazines. More than a half of the surveyed (52%) have never participated in training on diabetes. According to the authors of the research, such a situation resulted from the fact that the patients remained under the care of primary care doctors, who did not have enough time and sometimes insufficient knowledge [9, 16].

According to M. Gacek's research (2007), the majority of patients monitored their blood glucose level at least a few times a week and visited their family doctor once a month or every 2–3 months. A half of the female patients and 75% of male patients were overweight, and diabetes was frequently accompanied by high blood pressure and atherosclerosis. Within the framework of prevention from degenerative cardiovascular diseases, almost a half of the female patients and 15% of male patients monitored their blood pressure every day, and about 60% checked their cholesterol levels at least a few times a year. It has also been proved that about 60% of patients assess their knowledge on proceeding in disease as insufficient, despite the doctors' engagement in the health education process for patients [20]. On the basis of collected results concerning patients' health behaviours, as well as self-evaluation of their knowledge on diabetes, Karakiewicz et al. (2003) came to a conclusion that 38.9% of the surveyed thought that their knowledge about diabetes was insufficient. In this group, only 50% of patients regularly monitored their blood glucose level and wrote down the results, while blood pressure was only once a week, rarely or never. In spite of having consultations devoted to diet requirements, the patients had not changed their eating habits much, and the number of those overweight and obese, according to body mass index, exceeded 60% [21].

According to Brodalko's research (2005), 18.9% of patients mentioned incorrect body weight as a factor leading to diabetes. The respondents could not differentiate between overweight and obesity and used one term – 'obesity'. The surveyed were not familiar with the mechanism of negative influence of obesity on diabetes. 13% of the patients indicated inadequate diet (sweets, fatty meals) as a factor leading to

diabetes. All the patients followed the diet recommended by the doctor, which consisted in reducing the number of sweet and fatty food. None of the surveyed perceived a dose of physical activity as a treatment method in diabetes, although about 29.9% of patients participated in group trainings and 97.8% participated in individual trainings [22].

According to the research, after falling ill with diabetes, respondents tried to broaden their knowledge about the disease and acquired information from their doctor, nurse (94%), leaflets, brochures, books (58%), family, friends (24%), thanks to participation in talks (2%) and from the Internet (34%). The majority of the surveyed (68%) assessed their knowledge as sufficient. According to the analysis of Ławska et al. (2004), the majority of the surveyed (57.4%) claimed that they had little knowledge and skills. Respondents acquired knowledge mainly in diabetic clinic (64%), in hospital (52%), from a visiting nurse (6.6%) and from the media (10.6%) [9].

All methods of treatment of diabetes are based on a foundation: on education of people suffering from the disease. Comprehensive treatment requires an extensive knowledge transfer that enables a patient to actively participate in the process of achievement of therapy goals. Understanding the nature of the disease and principles of conduct determine to a large extent the possibility of therapy success. The goal is to teach patients rational self-care and self-management, which is very important for active participation in the activities of the health care team. Researches show that education and the consequent self-management improves patients' quality of life and its management [23]. Education should be the most practical possible and should start right after the disease is diagnosed. The process of patient's education should be ongoing, planned, based on recent knowledge, as well as adjusted to individual needs and abilities of a patient [5]. One of the elementary goals of education is patients' engagement in self-management. Self-management makes possible an independent assessment of influence of lifestyle, dietary treatment, oral hypoglycaemic drugs or insulin treatment, observation of the effect of drugs and threats of hypoglycaemia. Self-management should be disseminated and available for all people suffering from diabetes through the health care system. To properly manage diabetes it is constantly essential to systematically, precisely and carefully keep a notebook of self-management. This kind of 'log book' is very important, both for the patient himself and for the physician. Patient should learn how to observe symptoms of diabetes on their own and how to diagnose them.

Skilful and systematic cooperation of a patient with the treatment team is of fundamental importance when it comes to improvement of treatment results and preventing the complications of diabetes [15]. Education of diabetic patients should be the basic element of treatment process. Nowadays, it is already treated on an equal footing with pharmacological treatment, dietary treatment and a physical activity plan. Health education is a process in which people learn how to care for their own health, as well as the health of others, and make choices that are favourable to health. Its essence is also to change the attitudes of patients and physicians in the therapeutic process, as well as the adoption of partner roles, both by the patient and medical team. Therapeutic education is particularly important in diabetes, since it significantly influences the decrease of risk of severe and late complications of the disease which, in turn, are the main cause of disability and death [24].

The aim of diabetes education is to provide information about the basic behaviours of a diabetic patient, treatment methods, glycaemic control, and explanation of the nature of the disease. It contributes to the formation of adaptive and incentive mechanisms, improvement of the quality of life, and to getting rid of the sense of being ill, and the stress associated with the disease [24].

Diabetes education may be performed individually or for a group. Individual education allows a patient to adjust it to their individual needs, interests and abilities. However, group education is a very good method for extending knowledge about diabetes in a planned way. It allows patients to increase their motivation and change their behaviours. Moreover, its valuable advantage is the presence of other sick people. It contributes to direct knowledge and exchange of experiences [15].

Research conducted in the USA has proved that patients gain knowledge about the disease from various sources, such as educational programmes, meetings with health service representatives, as well as trainings preparing for monitoring on one's own of the level of glucose in the blood. The research conducted by Brucea D. et al. (2003) aimed at assessment of knowledge on diabetes among patients is related to earlier participation in educational programmes devoted to diabetes, dieticians' visits or applying self-management, and what type of education was of greatest importance. It has been proved that participation in educational programmes, dieticians' visits and self-management were independently related to better knowledge about diabetes. Older patients with limited education in this subject matter, who did not speak fluently in English due to their origin (people from southern Europe, from native Australian ethnic groups), presented a significantly lower level of knowledge. Those patients had probably not received the optimal level of knowledge due to their own limitations and worse access to the health service. According to the researchers, educational programmes, dieticians' visits and self-management are important source of information for patients and increase the level of knowledge about diabetes. Therefore, limitations in access and use of contemporary diabetes education should be a challenge for health service personnel who should use specialised educational programmes [25].

Duke et al. (2009) in their research attempted to demonstrate whether there were differences in the level of knowledge between patients who participated in individual education and those who participated in group education on diabetes. The results showed that individual education had slightly improved glycaemic control within the period from 12–18 months. In comparing individual education to group education, no significant differences were noted when it comes to body weight indicator and systolic and diastolic blood pressure [26].

## CONCLUSIONS

1. A patient's place of residence does not influence the quality of their knowledge about the disease. Patients have the same knowledge regardless of where they live: in rural or urban areas.
2. More than a half of the respondents were familiar with the symptoms of diabetes.
3. The level of knowledge regarding late complications in diabetes was insufficient and needs to be developed.

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