

# Diabetes and depression: a combination of civilization and life-style diseases is more than simple problem adding – literature review

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## Abstract

The article presents a review of current medical and psychological literature published between 2000 - 2010, with the use of the PubMed database, concerning the occurrence of anxiety and depression in diabetic patients, with particular consideration of those affected by complications. Anxiety and fear are the most frequent emotional disorders among diabetic patients. Depression occurs in approximately 30% of patients with diabetes. Both diabetes and depression belong to so called 'life style' or 'civilization diseases'. Numerous studies have confirmed that the course of depression in patients with diabetes is more severe, and the relapses of depression episodes are more frequent. The studies show that diabetic patients experience various types of psychosocial and emotional problems due to which the monitoring of own state of health is not the priority in life. In the process of treatment of both sole diabetes and concomitant anxiety and depression it is important to adjust and motivate patients to apply widely understood therapeutic recommendations. The treatment of depression syndrome in the course of diabetes does not have to lead to improvement in glycaemic control. The following factors influencing the therapeutic effect should be mentioned: duration of diabetes, presence of complications, and the effect of the drugs applied on body weight, or possibly initial diabetes management. It seems, therefore, that the patient education model based on the provision of knowledge concerning diabetes and its complications, methods of treatment, principles of nutrition and health-promoting life style, may be insufficient, at least for patients with depression. The results of a review of reports shows that an optimum treatment of diabetes, in accordance with the current state of knowledge, requires from physicians a special consideration of psychological and psychiatric knowledge for the 2 following reasons: 1) effectiveness of therapy to a high degree depends on the proper behaviour of a patient; 2) considerably more frequent, compared to the total population, occurrence of the symptoms of emotional disorders negatively affect the course of diabetes.

## Key words

diabetes or diabetes mellitus, complications of diabetes mellitus and depression, depression treatment and diabetic patients

## INTRODUCTION AND OBJECTIVE

Anxiety and fear are the most frequent emotional disorders among diabetic patients, which has been confirmed by the results of many studies [1-3]. Depression occurs in approximately 30% of patients with type 1 and type 2 diabetes [4]. Both diabetes and depression belong to so called 'life style' or 'civilization diseases'[5] and their development may depend on life-style – in the case of type 2 diabetes in females [6]. Depressive symptoms are among the major contributors to non-successive aging by the influence on both mental and physical health [7].

Depression may lead to an unhealthy life style among patients with high risk of coronary heart disease [8] and the life-style may be one of the major factors contributing to life span [9]. Additionally, good health perception and well-

being exert an effect on the mortality ratio [10]. Numerous studies have confirmed that the course of depression in patients with diabetes is more severe, and the relapses of depression episodes are more frequent, especially in patients with unbalanced diabetes. Data from the National Health and Nutrition Examination Survey indicate that attaining good diabetes control is possible in only approximately 40% of patients, whereas as many as 20% have HbA1c  $\geq$  9%, i.e., exceeding the most liberal levels accepted for patients [11].

It seems, therefore, that the patient education model based on the provision of knowledge concerning diabetes and its complications, methods of treatment, principles of nutrition and health-promoting life style, may be insufficient, at least for some patients. In the newest ADA Standards of Medical Care in Diabetes 2011 – Psychosocial assessments and care [12] was rated as E – as 'Expert opinion', which means that 'there is as yet no evidence from clinical trials, or in which there is conflicting evidence' [13]. On the other hand, Diabetes Self-Management Education (DSME) in the same recommendation was rated between B (need of self-management education).

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This allows the presumption that understanding the necessity for systemic care of a diabetic patient, also from the emotional and social aspects, to-date ADA has not found sufficient scientific evidence. The 2011 framework educational project discussed in the recommendations by the Polish Diabetic Association is complex, but sufficient for patients in a normal emotional and psychical state. However, in the case of depression syndrome accompanying diabetes, it may not be possible to perform this programme. [14].

The studies show that diabetic patients experience various types of psychosocial and emotional problems due to which the monitoring of own state of health is not the priority in life [15,16].

According to the assessments by researchers, 1 in 8 diabetic patients suffers from fully symptomatic depression [16-17], whereas as many as 1 in 5 of the remaining patients show symptoms of depression [16].

An adequate glycemic control contributes to psychical and physical well-being. Social support, which may alleviate the depression symptoms in these patients, is also extremely important. In the situation of facing a disease, an individual may undertake various strategies, i.e. those which may lead to acceptance of the illness and cooperation with a physician, and strategies which may lead to auto-destruction and lack of a positive relationship with the physician. The selected model of behaviour may depend, among other things, on the patient's emotional status.

The article presents a review of current literature concerning the occurrence of anxiety and depression in diabetic patients, with particular consideration of those affected by complications. Medical and psychological literature was analyzed with the use of the PubMed database, from the aspect of reports containing the key words *diabetes* or *diabetes mellitus*, *complications of diabetes mellitus* and *depression*, published between 2000 - 2010, available in English. The studies carried out on an underage population and concerning diabetes during pregnancy were excluded. Due to the large number of reports which fulfilled the above-mentioned criteria, the articles were selected which comprehensively describe the scope of problems of interest.

**State of knowledge.** Studies concerning the treatment of diabetic patients with anti-depressants confirmed a correlation between good general well-being and an improvement of glycemia control [18,19]. The results were obtained during cognitive-behavioural therapy in the case of patients with type 2 diabetes, and are difficult to interpret unequivocally [20].

Considering the presence of the relationship between depression symptoms and hyperglycemia, and the relationship between hyperglycemia and the development of complications, it may be concluded that the presence of depression is correlated with the risk of the occurrence of complications [21]. Efficient treatment of depression in diabetic patients with concomitant depression may prevent or delay the development of vascular complications of this disease [22]. Therefore, in the context of diabetes complications, an adequate psychiatric treatment is indispensable. Untreated depression may lead to negative and harmful behaviours concerning life-style (avoiding physical effort) [23], emotional overeating [24] including night-eating syndrome [25] and cigarette smoking [24]. This also leads to nutritional disorders – psychological anorexia and bulimia,

especially in female patients with type 1 diabetes [26]. Last, but not least, it leads to poor self-care and self-management and treatment adherence [23,24].

Depressive disorders may precede the development of diabetes, although their relationship has not been unequivocally confirmed [27], and may also concern the negative effect of depression on a patient's life-style [23-25]. Depressive disorders concomitant with diabetes are correlated with a higher risk of the occurrence of complications, macro- and micro-vascular, both in type 1 and 2 diabetes [5,12,21,25,26,28-30] as in, e.g. De Groot who performed meta-analysis based on studies concerning type 1 and 2 diabetes during the period 1975-1999 [21]. In the Fremantle Study, the group of diabetic patients examined exceeded 1,400 individuals aged over 7 [28]. Despite this, it was not confirmed that depression was an independent predictor of total mortality or mortality due to cardiovascular diseases [28].

There is a relationship between the presence of depression in diabetic patients and deterioration of glycaemia [30] and between depression and some neurohormonal changes, including increase in counterregulatory hormones (cortisol, catecholamines, growth hormone) which may lead to insulin resistance and impaired B cell function – the fundamental changes for type 2 diabetes [31].

On the other hand, it seems that there is no way of reversal – the effective treatment of depression (reduction of scores in depression scales of Becks and Hamilton) does not improve fasting glycaemia nor the level of HbA1c during one year of observation [32].

Depression which fulfills the criteria of a severe episode is an independent risk factor of the development of IHD in females with diabetes [33]. The relationship between the presence of depression and the development of subclinical atherosclerosis of the carotid arteries concerns exclusively males with type 1 diabetes [30].

The episode of severe depression increases the risk of death almost 3-fold due to diabetes related uraemia, compared to patients without depression, or with mild or moderate intensity of symptoms diagnosed [34]. In addition, a faster progression of diabetic retinopathy was observed in patients with type 1 diabetes, and those obtaining high depression indices according to the Beck's scale [35]. A correlation was confirmed between the occurrence of neuropathy and presence of depression symptoms in diabetes [36], and it was also found that diabetes complicated by polyneuropathy correlates with worse glycemia control and a higher risk of anxiety and depressive disorders [37].

Patients with diabetes complications report primarily the deterioration of the quality of life caused by emotional disorders [38-41]. In about a half of diabetic patients hospitalized due to cardiovascular diseases, concomitant depressive and anxiety symptoms were also noted [38,42,43].

A group of risk factors was specified which directly result in the occurrence of a severe depression episode in the course of diabetes, including past depressive episode, degree of intensity of symptoms of diabetes, and past cardiovascular surgeries [44]. It was estimated that the presence of depression in patients with diabetes increases the costs of treatment by 50-75% [45]. A correlation was also confirmed between depression in diabetes and cognitive functions disorders [46]. The studies show that the episode of severe depression

accompanying diabetes increases the risk of the development of dementia [47].

Compared to the healthy individuals who participated in the study, adults with type 1 diabetes reported more symptoms of depression and a greater use of antidepressants [48]. The percentage of mental disorders, including anxiety and depression, observed in the population of young adults with type 1 diabetes is estimated at two or three times higher than in the population of their healthy contemporaries [49]. Fear of development of late complications of diabetes accompanied a considerable group of adolescents. According to a comparative report, 20% of diabetic patients showed symptoms of anxiety, whereas among healthy individuals this percentage was 8% [50].

In the relevant literature, two diabetes-related types of anxiety were also distinguished: fear of hypoglycemia and fear of late complications [49, 51-52].

A patient's fear of hypoglycemia is frequently encountered by the clinicians. This emotional status may lead to intentional or unintentional activities by the patients, aimed at the elevation of the level of blood glucose in order to 'protect oneself' against hypoglycemia [53]. In addition, the process itself, by exerting an effect on the autonomic system, e.g. induction of hunger, but also heart palpitations or feeling of anxiety, may lead to the deterioration of metabolic control and reinforcement of anxiety, or lead to a phobia [54]. This occurs especially in type 1 diabetes, in which hypoglycemia may be a fatal event, also due to the induction of heart rhythm disorders, [55]. In a case of type 2 diabetes the amount of hypoglycemia increases due to duration of the disease (over 5 years) and with the administration of insulin [56]. As a result, diabetes may lead to the occurrence of decreased life satisfaction, low level of social activity, deterioration of the cognitive functions, and induce sleep disorders [57].

Studies of the Turkish population show that depression and anxiety constitute approximately 45% of psychiatric disorders in diabetic patients [58]. Nearly 79% of respondents in the presented survey experience anxiety related to diabetes. In patients with type 1 diabetes the level of anxiety was higher than in those with type 2 diabetes, due to the troublesome life mode in diabetic patients taking insulin [59].

Tuncay noted that males showed a higher level of anxiety than females, respondents with a higher level of education demonstrated a higher level of anxiety than those with a lower level of education, and patients who had a higher monthly salary were characterized by a higher level of anxiety, compared to those with a lower income [58]. An additional source of anxiety for patients may be knowledge of the effect of various hypoglycemicizing therapies on an increase in the number of cancerous diseases, as well as the effect of diabetes and hyperglycemia *per se* on mortality due to cancerous diseases [60-62]. The total impact of cancer-related fear among diabetic patients is not known; however, in a similar evaluation carried out among patient's parents, the level of cancer-related distress significantly exceeded the level of distress connected with diabetes [63].

In studies conducted in Croatia, a clinical form of depression was diagnosed in 33% of patients with diabetes [50]. According to Pouwer, 10-20% of patients with type 2 diabetes had depression; nevertheless, it was frequently undiagnosed [64]. In many studies it was noted that in diabetic patients the course of depression is more severe, and the relapses of depressive episodes more frequent, especially among those

with less balanced diabetes control [58,59,65]. Conclusions drawn based on meta-analysis carried out among the Chinese population indicate that depression occurs twice as often in diabetic patients than in the total population [65].

It is noteworthy that the risk of complications is increased for patients with both type 1 and 2 diabetes, despite the differences in etiology between these two diseases. The common background seems to be an increase in the severity of the disease or the number of complications [21], as well as the method of treatment. Patients treated with insulin, with poor glycaemic control, seem to be at risk of deterioration of depressive symptoms, unlike those taking oral hypoglycaemic agents [66].

Pharmacological treatment of depression among diabetic patients has mixed outcomes. There is strong evidence that depression has a significant impact on diabetic disability – even 7 times more (unemployment, lack of social activities), compared to patients with one isolated condition (diabetes or depression) [67], and that in low income communities pharmacological treatment of depression improved the level of HbA1c [68].

On the other hand, there is evidence that the connection between diabetes and depression worsens the effects of antidepressant therapy, especially among patients with pain [69]. The observed lack of reduction in the events of disorders in carbohydrate metabolism or improvement of glycemia as a result of treatment with antidepressants may be associated with weight gain and the development of obesity [70], or the negative impact on behavioural factors [13-16, 71].

It was confirmed that the treatment of depression lasting for a year results in a considerable improvement (a decrease on the Beck and Hamilton scale); however, it is not converted into the improvement of glycemia, understood neither as the fasting blood glucose nor the HbA1c level. It should be mentioned that the initial HbA1c level was relatively low (7.6%) [32]. The study by Lustman, conducted in the 90s, showed that a higher initial HbA1c level (10.3%) was accompanied by an improvement in glycaemic patients [20]. The results of selected studies also indicate that there is a strong relationship between glycaemia control and the level of depression among patients with type 1 diabetes [72-74].

With two or more diabetes complications and concomitant depression care based on the cooperation of many specialists is more effective in the reduction of depression symptoms than primary health care [75]. Such common medical care is even more important. According to the studies by Northam, adolescents aged 12 - after making the diagnosis of diabetes, despite their well-being as good as that of the control group – more rarely completed their schooling (by 17%), and more often required psychiatric assistance (19%) [76].

## SUMMARY

Anxiety and depression are the most frequent emotional disorders occurring in diabetes. At present, it is known that the relationship between diabetes and depression is higher than that between diabetes and other psychiatric disorders.

The presence of a chronic disease (or a number of diseases) intensifies the risk of the occurrence of depressive and anxiety disorders, which may additionally deteriorate the state of a patient by exerting a negative effect on his/her willingness

for treatment, cooperation with a physician, or even make self-control impossible.

In the process of treatment of both sole diabetes and concomitant anxiety and depression it is important to adjust and motivate patients to apply widely understood therapeutic recommendations.

The treatment of depression syndrome in the course of a chronic disease such as diabetes does not have to lead to improvement in glycaemic control. The following factors influencing the therapeutic effect should be mentioned: duration of diabetes, presence of complications, and the effect of the drugs applied on body weight, or possibly initial diabetes management.

The results of a review of reports for the years 2000-2010 shows that an optimum treatment of diabetes, in accordance with the current state of knowledge, requires from physicians a special consideration of psychological and psychiatric knowledge for the following reasons:

- effectiveness of therapy to a high degree depends on the proper behaviour of a patient, especially constant independent observance of a doctor's orders;
- considerably more frequent, compared to the total population, occurrence of the symptoms of emotional disorders, which are not only the source of problems in social functioning, but also negatively affect the course of diabetes.

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