

Research Article

# Dynamics of Psychological Status and Quality of Life Indicators in Patients with Diabetes Mellitus Type 2 and Chronic Gastritis Before and After the Treatment

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## Abstract

Depression increases the risk of diabetes mellitus type 2 development and the subsequent risks of hyperglycemia, insulin resistance, micro- and macro-vascular complications. The association between depression and diabetes mellitus type 2 may include autonomic and neurohormonal dysregulation, weight gain, inflammation, and structural changes in the hippocampus.

**Objective of the work.** To evaluate the psychological status and quality of life indicators in patients with diabetes mellitus type 2 and chronic gastritis before and after the treatment with the use of medicine Magnicum-Antistress.

**Materials and methods.** Based on the Endocrinology Department of the Transcarpathia Regional Clinical hospital named after A. Novak there were examined 40 patients, whose average age was to  $53.7 \pm 4.1$  years. All patients with diabetes mellitus type 2 and chronic gastritis were assessed for quality of life, psychological status, and stress levels using questionnaires, namely using the SF-36, "PSM-25 Psychological Stress Scale methodology", Holmes and Rahe stress test. After the survey, all patients were treated with Magnicum-Antistress medicine on the background of pathogenetic treatment.

**Results.** Thus, after the course of treatment during 1 month, the level of stress decreased, so in the male patients the high level of stress was observed in 58.3% of patients, and among female patients – 35.8%. Also, the level of stress-resistance increased, so in male patients, the low stress-resistance level was observed in 66.7% of patients, and among female patients – 25%. After the course of treatment according to the Quality of Life Assessment Scale (SF-36), patients showed a positive tendency in the indicators of the psychological and physical health components.

**Conclusions.** The level of chronic stress in patients with DM type 2 and CG is mostly high (52.5%). The level of stress-resistance in the vast majority of patients with DM type 2 and CG is low (52.5%). Complex therapy with the use of the medicine Magnicum-Antistress in patients with DM type 2 and CG is pathogenetically justified, and also leads to an improvement in the quality of life and stress-resistance in these patients.

## Keywords

diabetes mellitus type 2; chronic gastritis; stress; magnesium.

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## Problem statement and analysis of the latest research

Depression – is a disease in which a person feels depressed for a long time (at least two weeks), loses interest in activities that have previously been satisfying, and cannot do the daily activities. Clinically significant depression is present in each of four people with type 2 diabetes mellitus. The depression increases risk of diabetes mellitus type 2 development and the subsequent risks of hyperglycemia, insulin resistance, micro- and macro-vascular complications in depression. Conversely, diabetes mellitus type 2 diagnosis increases the risk of incident depression and may contribute to more severe depression. The association between depression and diabetes mellitus type 2 may include autonomic and neuro-hormonal dysregulation, weight gain, inflammation, and structural changes in the hippocampus. [1]

Magnesium is a vital electrolyte. Magnesium deficiency is associated with cardiovascular disease, arteriosclerosis, diabetes mellitus, and metabolic syndrome. Daily magnesium intake leads to a significant reduction in symptoms of depression and anxiety, regardless of age, gender, the initial severity of depression, or antidepressant use. Thus, magnesium is a fast, safe and readily available alternative or supplement before the beginning or increase of antidepressants' dose. [2]

One of the most studied chronic diseases as for the magnesium deficiency is type 2 diabetes mellitus and metabolic syndrome. Magnesium plays a crucial role in glucose and insulin metabolism, mainly due to its effect on insulin receptor tyrosine kinase activity by transferring a phosphate from ATP to a protein. Magnesium can also affect the activity of phosphorylase b kinase by releasing glucose-1-phosphate from glycogen. Besides, magnesium can directly affect glucose transporter 4 (GLUT4) and helps regulate glucose translocation into the cell. [3]

Magnesium also potentiates the phosphorylation of cAMP-binding protein (CREB), increases BDNF expression in the prefrontal cortex, and enhances the activation of calcium/calmodulin-dependent protein kinase II (CaMKII). BDNF and CaMKII are

reduced in certain brain regions in patients who suffer from different types of depression. [4]

According to scientific sources, serum fasting plasma glucose, postprandial glycemia, and serum glycosylated hemoglobin (HbA1c) are higher in patients with hypomagnesemia than in patients with normomagnesemia. The percentage of adipose tissue is also significantly higher in patients with hypomagnesemia compared with patients with normomagnesemia. That is, the low concentration of magnesium in the blood of patients with type 2 diabetes is directly related to poor metabolic control. [5]

Serum magnesium levels were found to decrease with increasing HbA1c levels and the duration of type 2 diabetes. Hypomagnesemia is associated with poor control of diabetes mellitus type 2. Besides, serum magnesium depletion increases exponentially with disease duration. [6]

Drugs such as proton pump inhibitors, can impair the absorption of magnesium in the gastrointestinal tract. This effect may be the result of a drug-induced decrease in pH that alters the affinity of the transient receptor potential of Melastatin-6 and Melastatin-7 (TRPM6, TRPM7) channels of the apical surface of enterocytes for magnesium. [7]

According to recent recommendations of the Magnesium Research Association, the patients with diabetes mellitus are benefiting in four categories from magnesium intake: insulin-sensitizing, calcium antagonism, stress regulator and stabilizing effects of the endothelium. [8]

**The objective of the research.** To evaluate the psychological status and quality of life indicators in patients with diabetes mellitus type 2 and chronic gastritis before and after the treatment with the use of medicine Magnicum-Antistress.

## 1. Materials and Methods

There were examined 40 patients (whose average age was  $53.7 \pm 4.1$  years old) on the basis of the endocrinology department of the Transcarpathian Regional Clinical Hospital named after A. Novak. This study was performed with the participation of 28 (70%) female and 12 (30%) male. All patients were diagnosed with diabetes mellitus type

2. The diabetes mellitus type 2 diagnosis was made according to the International Diabetes Federation guidelines (IDF, 2005), namely, the determination of the glucose level in the blood serum in fasting state and 2 hours after its intake, that was performed using glucose oxidase test. The degree of diabetes mellitus compensation was assessed by the level of glycosylated hemoglobin (HbA1c, %), which was determined with the help of chromogenic analysis using a Sysmex 560 apparatus (Japan) and Siemens reagents. All the patients were performed fibroesophagogastroduodenoscopy (FEGDS using a "Pentax FG-29V" endoscope, Japan) with a targeted biopsy (5 biopsy specimens were taken from the gastric mucosa). These specimens were transmitted for further histological examination. HP was determined using a rapid urease test (CLO-test) and determination of HP antigens in feces (CITO TEST H.Pylori Ag, Pharmasco, Ukraine). The evaluation of the quality of life, psychological status, and stress levels using questionnaires, namely, using the SF-36, PSM-25 Psychological Stress Scale, Holmes-Rahe Stress Assessment was performed in all patients with DM type 2 and CG.

The "PSM-25 Psychological Stress Scale" aims to assess the level of stress feelings in somatic, behavioral and emotional indicators. Thus, the patients should evaluate their overall condition by selecting a number from 1 to 8 for each of the 21 statements, that most clearly expresses the patient's condition during the last days (4-5 days). Further, the results are processed and interpreted, if the patient scored less than 99 points – low stress, 100 - 125 points – medium stress, more than 125 points – high stress.

The stress test (Holmes and Rahe) consists of a scale comprising 43 questions about important life events, each of which is answered by a certain number of points depending on the degree of stress. A large number of points are an alarm to alert you to the risk of psychosomatic illnesses. So, if the total score is 150-199 – the degree of resistance to stress is high, 200-229 points – the threshold, 300 or more points – low one.

The "SF-36 Health Status Survey" refers to non-specific quality of life (QOL) questionnaires. The

36 items of the questionnaire are grouped into eight scales: physical functioning, role-playing activity, physical pain, general health, vitality, social functioning, emotional state, and mental health. The indices for each scale vary between 0 and 100, where 100 represents full health, all scales form two indicators: the psychological and the physical component of health.

After the survey, all the patients were treated with Magnicum-Antistress medication on the background of pathogenic treatment. Magnicum-Antistress was given at a dose of 2 tablets 2 times a day for 1 month.

The criteria for enrolling patients in this study were:

Patients with a confirmed diagnosis of type 2 diabetes and chronic gastritis associated with HP;

Exclusion criteria for this study were:

Type 1 diabetes patients;

All studies were carried out with the consent of patients, and their methodology was consistent with the 1975 Declaration of Helsinki and its revision in 1983.

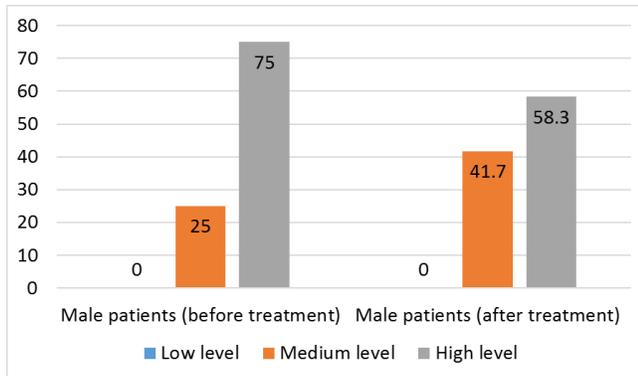
Scientific research is a fragment of the DB theme # 851 "Mechanisms of formation of complications in diseases of the liver, methods of their treatment and prevention" (state registration number 0115U001103), as well as the scientific theme of the Department of Internal Medicine Propedeutics "Polymorbid pathology in the diseases of digestive tract, pathogenesis peculiarities, possibilities of correction" (state registration number 0118U004365).

The analysis and processing of the results of the patients' examination were carried out using the computer program STATISTICA 10.0 (StatSoftInc, USA).

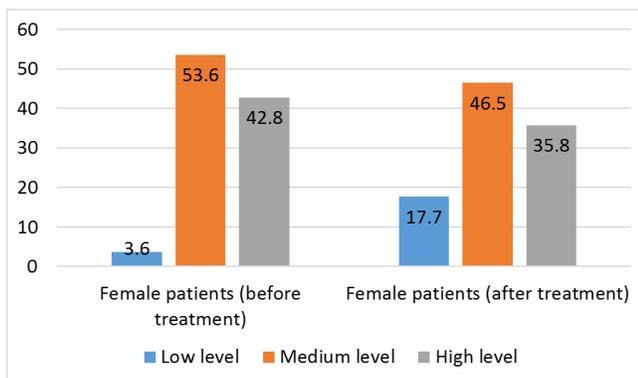
## **2. Results and Discussion**

The following results were observed after the PSM-25 psychological stress questionnaires' analysis. The chronic stress was found in all patients before treatment according to the results of the questionnaire. Also, in patients with DM type 2 and with CG, a high level of stress was significantly more likely to be observed compared with female patients.

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**Figure 1.** Dynamics of stress in male patients with DM type 2 and CG before and after the treatment based on the PSM-25 questionnaire (%).

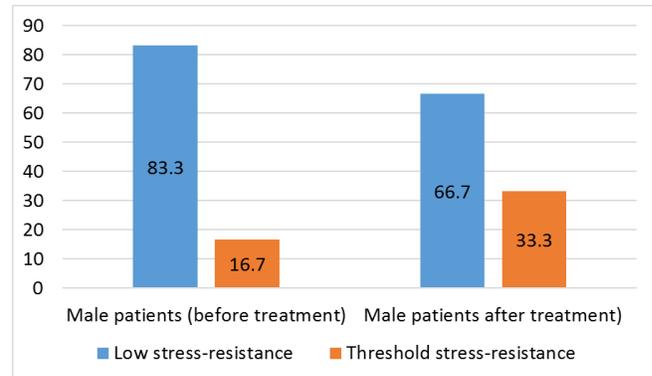


**Figure 2.** Dynamics of stress in female patients with DM type 2 and CG before and after the treatment based on the PSM-25 questionnaire (%).

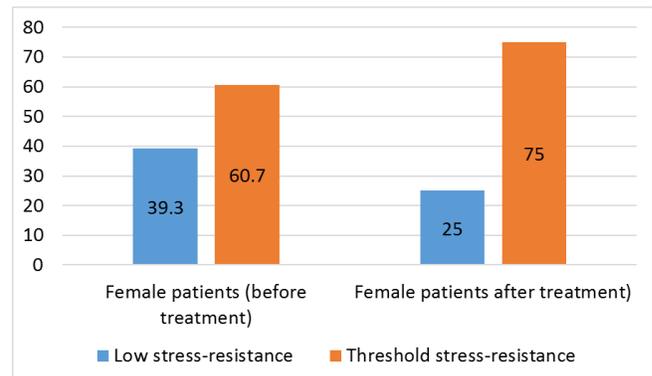
The obtained data about stress levels are represented in Fig. 1.

As can be seen from Fig. 1, among male patients 3 (25%) patients have moderate stress level, and 9 (75%) have high-stress level. Male patients experienced an improvement in their psychological state, with 5 (41.7%) patients suffering from an average level of stress and 7 (58.3%) – had a high level of stress.

As can be seen from Fig. 2, low levels of stress were found in one female patient (3.6%). There were 15 (53.6%) female patients who scored 100-125 points that indicate an average level of stress, and 12 (42.8%) patients – more than 125 points, that means they have high level of stress. The level of stress decreased in female patients after the treatment. Thus, a low level of stress was detected in 5



**Figure 3.** Dynamics of stress-resistance in male patients with DM type 2 diabetes and CG before and after the treatment according to Holmes-Rahe questionnaire (%).



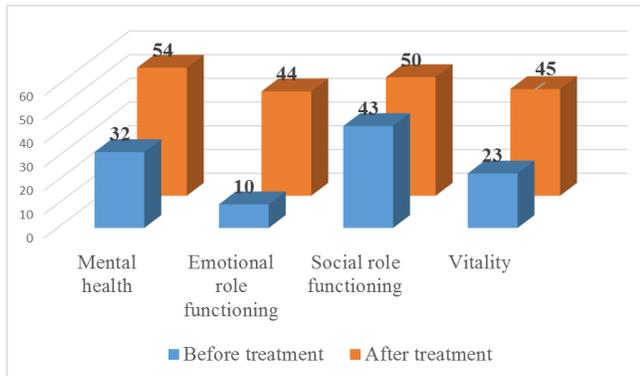
**Figure 4.** Dynamics of stress-resistance in female patients with DM type 2 diabetes and CG before and after the treatment according to Holmes-Rahe questionnaire (%).

(17.7%) patients, the average level – in 13 (46.5%) and the high level in 10 (35.8%) patients.

No high-stress threshold was found among the patients of both genders with DM type 2 and CG, according to the data. The results found by the processing of the stress assessment test (Holmes and Rahe) questionnaire are represented in Fig. 3.

In patients with DM type 2 and CG, low stress tolerance level was more commonly reported before the treatment, namely, 10 (83.3%) patients and 2 (16.7%) patients had a threshold level distress tolerance. In patients with type 2 diabetes mellitus and CG, a low level of stress was observed in 8 (66.7%) patients and 4 (33.3%) patients with a threshold stress-resistance level.

## Dynamics of Psychological Status and Quality of Life Indicators in Patients with Diabetes Mellitus Type 2 and Chronic Gastritis Before and After the Treatment — 5/6



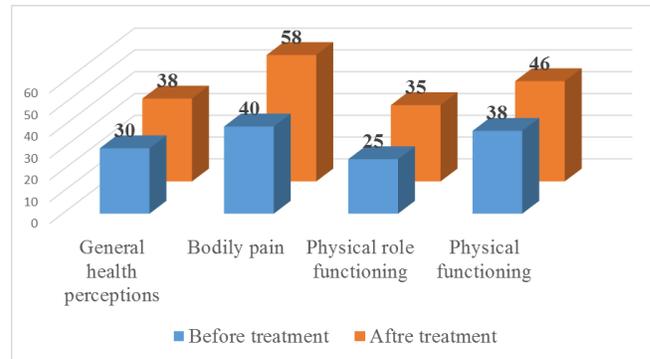
**Figure 5.** Dynamics of the health psychological component according to the SF-36 questionnaire in patients with DM type 2 and CG before and after the treatment.

As can be seen from Fig. 4, among female patients showed low stress-resistance level in 11 (39.3%), and threshold stress-resistance – in 17 (60.7%) patients before the treatment. Therefore, after the treatment among female patients, a low stress-resistance level was found in 21 (75%) and threshold stress-resistance in 7 (25%) patients.

According to the evaluation of the health psychological component according to the SF-36 quality of life rating scale in patients with DM type 2 and CG before and after the treatment, the following results were obtained (Fig. 5).

Therefore, according to Fig. 5, the health psychological component improved slightly in patients with DM type 2 and CG after the treatment, so patients rated their psychological health as much as 54 points, compared to 32 before the treatment; role emotional functioning – 10 points before and 44 points after the treatment; social functioning – 43 points before and 50 points after the treatment; viability – 23 points before and 45 points after the treatment. According to the evaluation of the health psychological component according to the "SF-36" quality of life rating scale, in patients with DM type 2 and CG before and after the treatment, the following results were obtained (Fig. 6).

Therefore, according to Fig. 6, physical health components improved slightly in patients with DM type 2 and CG after the treatment, so patients rated their overall health as much as 38 points, compared



**Figure 6.** Dynamics of the physical health component according to the SF-36 questionnaire in patients with DM type 2 and CG before and after the treatment.

with 30 before treatment; pain factor – 40 points before and 58 points after the treatment; role physical functioning – 25 points before and 35 points after the treatment; physical functioning – 38 points before and 46 points after the treatment.

Thus, after the course of treatment within 1 month, the level of stress decreased, so in male patients the high level of stress was observed in 58.3% of patients, and among the female patients – 35.8 ones. Also, the level of stress-resistance increased in male patients, the low stress-resistance level was observed in 66.7% of patients, and among the female patients – 25% one. After a course of treatment according to the Quality of Life Assessment Scale (SF-36), patients showed a positive trend in the indicators of the psychological and physical components of health.

The sufficient amount of magnesium in the blood helps to improve glycemic control, reduce the level of oxidative stress and insulin resistance, and at least every 4 patients with DM type 2 suffer from depressive correction and psychological status of patients, so use of the medicine Magnicum-Antistress in DM type 2 is justified. Magnesium is involved into the metabolism of carbohydrates, proteins, and fats, as well as redox reactions, and in combination with pyridoxine, it has a positive effect on diabetic polyneuropathy. This medicine also helped to normalize the function of the nervous system, reducing the feeling of irritability and fear.

### 3. Prospects of Further Researches

Further study of the magnesium treatment effect on the course of DM type 2 and CG.

### 4. Conclusions

1. The chronic stress level in patients with DM type 2 and CG is overwhelmingly high (52.5%), and the average stress level is observed in 45% of patients.
2. High-stress level was more commonly observed in male patients with DM type 2 and CG than in female patients – 75% and 42.8%, respectively.
3. The stress-resistance level in the vast majority of patients with DM type 2 and CG is low (52.5%) and threshold in 47.5%.
4. Low stress level was more commonly observed in male patients with DM type 2 and CG than in female patients – 83.3% and 39.3%, respectively.
5. Complex therapy with the use of the medicine Magnicum-Antistress in patients with DM type 2 and CG is pathogenetically justified, and also leads to an improvement of quality of life and stress-resistance in these patients.

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**Received:** 2019-12-02

**Revised:** 2020-02-17

**Accepted:** 2020-03-03