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INFLUENCE OF ASTHENIA ON THE PSYCHOLOGICAL WELL-BEING OF PATIENTS WITH TYPE 2 DIABETES IN AKTOBE

Ainur N. Zinalieva[1], https://orcid.org/0000-0003-0608-0964
Gaukhar S. Dilmagambetova[1], https://orcid.org/0000-0002-8123-3476
Aigul Sh. Sartayeva[1], https://orcid.org/0000-0002-3262-8906
Akmaral M. Baspakova[1], https://orcid.org/0000-0002-0883-2245
Dana T. Begalina[1], https://orcid.org/0000-0003-0162-5005
Moldir B. Akhmetzhanova[1], https://orcid.org/0000-0001-9342-2816
Zoya B. Moldasheva[1], https://orcid.org/0000-0002-9203-283X
Asem M. Tuleuova[1], https://orcid.org/0009-0007-0291-522X
Dinara R. Issemgaliyeva[1], https://orcid.org/0009-0002-1433-0839
Aigerim A. Umbetova[1], https://orcid.org/0009-0007-4275-1952
Maiya K. Taushanova[1], https://orcid.org/0000-0002-0165-9312

[1] West Kazakhstan Marat Ospanov Medical university,
Department of General Medical Practice No. 2,
Aktobe, Republic of Kazakhstan.

Abstract

Abstract. Asthenia in patients with type 2 diabetes mellitus is a complex and multifaceted phenomenon that affects the physical and psycho-emotional state of patients. This condition of fatigue often arises against the background of chronic hyperglycemia, metabolic disorders, and complications of comorbid diseases.

The aim of our study was to examine the susceptibility to asthenia in patients with type 2 diabetes mellitus in the city of Aktobe.

Methods. The study design was a cross-sectional clinical study without a control group. The study population consisted of 1,500 patients with type 2 diabetes mellitus registered for follow-up care in state polyclinics of Aktobe, aged 18 to 70 years. To determine the degree of fatigue, the MFI–20 assessment scale was used.

Results. The findings indicate a tendency toward deterioration in each of the five indicators of psychophysical health in patients with type 2 diabetes mellitus. When comparing two independent groups, statistically significant differences were found in the indicators of general and physical asthenia ($p < 0.01$ for each indicator).

Conclusions. Patients with type 2 diabetes mellitus are susceptible to asthenia. The highest frequency of general asthenia was observed in patients with a diabetes duration of 5 to 10 years. A higher frequency of general asthenia was found among unemployed patients. Significant differences were established when comparing male and female patients with T2DM in terms of general and physical asthenia.

Keywords*: type 2 diabetes mellitus, asthenic syndrome, MFI–20 asthenia assessment scale, fatigue, psychological state.*

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Резюме

ВЛИЯНИЕ АСТЕНИИ НА ПСИХОЛОГИЧЕСКОЕ БЛАГОПОЛУЧИЕ ПАЦИЕНТОВ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА Г. АКТОБЕ

Айнур Н. Зиналиева[1], https://orcid.org/0000-0003-0608-0964
Гаухар С. Дильмагамбетова[1], https://orcid.org/0000-0002-8123-3476
Айгуль Ш. Сартаева[1], https://orcid.org/0000-0002-3262-8906
Акмарал М. Баспакова[1], https://orcid.org/0000-0002-0883-2245
Дана Т. Бегалина[1], https://orcid.org/0000-0003-0162-5005

Молдир Б. Ахметжанова[1], https://orcid.org/0000-0001-9342-2816
Зоя Б. Молдашева[1], https://orcid.org/0000-0002-9203-283X
Асем М. Тулеуова[1], https://orcid.org/0009-0007-0291-522X
Динара Р. Исемгалиева[1], https://orcid.org/0009-0002-1433-0839
Айгерим А. Умбетова[1], https://orcid.org/0009-0007-4275-1952
Майя К. Таушанова[1], https://orcid.org/0000-0002-0165-9312

[1] Западно-Казахстанский Медицинский Университет имени Марата Оспанова,
Кафедра общей врачебной практики №2,
г. Актобе, Республика Казахстан.

Аннотация. Астения у больных сахарным диабетом 2 типа - сложное и многогранное явление, влияющее на физическое и психоэмоциональное состояние больных. Такое состояние утомления часто возникает на фоне хронической гипергликемии, нарушений обмена веществ и осложнений сопутствующих заболеваний.

Целью нашего исследования является изучение подверженности астении пациентов с сахарным диабетом 2 типа г. Актобе.

Методы исследования. Дизайн исследования - поперечное клиническое исследование без контрольной группы. Исследуемая популяция состояла из 1500 пациентов с сахарным диабетом 2 типа, находящихся на диспансерном учете в государственных поликлиниках города г. Актобе, в возрасте от 18 до 70 лет. Для определения степени усталости была использована шкала оценки MFI–20.

Результаты. Полученные результаты указывают на тенденцию ухудшения в каждом из пяти показателей психофизического состояния здоровья у пациентов с сахарным диабетом 2 типа. При сравнении двух независимых групп статистически значимые различия установлены по показателям общая и физическая астения ($p<0,01$ для каждого показателя).

Выводы. Пациенты с сахарным диабетом 2 типа подвержены астении. Наибольшая частота общей астении имеется у пациентов с длительностью диабета от 5 до 10 лет. Более высокая частота общей астении выявлена среди неработающих пациентов. Значимые различия установлены при сравнении по полу пациентов СД2 к общей и физической астении.

Ключевые слова: *сахарный диабет 2 типа, астенический синдром, шкала оценки астении MFI–20, усталость, психологическое состояние.*

Для цитирования:

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Түйіндеме

АҚТӨБЕ ҚАЛАСЫНДА 2 -ТИПТІ ҚАНТ ДИАБЕТІМЕН АУЫРАТЫН НАУҚАСТАРДЫҢ ПСИХОЛОГИЯЛЫҚ ӘЛ-АУҚАТЫНА АСТЕНИЯНЫҢ ӘСЕРІ

Айнур Н. Зиналиева[1], https://orcid.org/0000-0003-0608-0964
Гаухар С. Дильмагамбетова[1], https://orcid.org/0000-0002-8123-3476
Айгуль Ш. Сартаева[1], https://orcid.org/0000-0002-3262-8906
Акмарал М. Баспакова[1], https://orcid.org/0000-0002-0883-2245
Дана Т. Бегалина[1], https://orcid.org/0000-0003-0162-5005
Молдир Б. Ахметжанова[1], https://orcid.org/0000-0001-9342-2816
Зоя Б. Молдашева[1], https://orcid.org/0000-0002-9203-283X
Асем М. Тулеуова[1], https://orcid.org/0009-0007-0291-522X
Динара Р. Исемгалиева[1], https://orcid.org/0009-0002-1433-0839
Айгерим А. Умбетова[1], https://orcid.org/0009-0007-4275-1952
Майя К. Таушанова[1], https://orcid.org/0000-0002-0165-9312

[1] Марат Оспанов атындағы Батыс Қазақстан медицина университеті, №2 жалпы дәрігерлік практика кафедрасы, Ақтөбе қаласы, Қазақстан Республикасы.

Аннотация. 2 -типті қант диабетімен ауыратын науқастардағы астения - науқастың физикалық және психоэмоционалды жағдайына әсер ететін күрделі және көп қырлы құбылыс. Шаршау мен әлсіздіктің бұл күйі жиі созылмалы гипергликемия, метаболикалық бұзылулармен қатар жүретін аурулардың салдарында пайда болады.

Біздің зерттеуіміздің мақсаты Ақтөбе қаласындағы 2- типті қант диабетімен ауыратын науқастардың астенияға бейімділігін зерделеу болып табылады.

Зерттеу әдістері. Зерттеу дизайны бақылау тобынсыз көлденең қималық клиникалық зерттеу болды. Зерттелетін популяцияны Ақтөбе қаласының мемлекеттік емханаларында есепте тұрған 2 -типті қант диабетімен ауыратын 18 бен 70 жас аралығындағы 1500 пациент құрады. Сауалнама жүргізу үшін MFI-20 астенияны бағалау шкаласы қолданылды.

Нәтижелер. Алынған нәтижелер 2- типті қант диабетімен ауыратын науқастардың психофизикалық денсаулық жағдайының бес көрсеткішінің әрқайсысында нашарлау үрдісін көрсететті. Екі тәуелсіз топты салыстыру кезінде жалпы және физикалық астения көрсеткіштері бойынша статистикалық маңызды айырмашылықтар анықталды (әр көрсеткіш үшін $p<0,01$).

Қорытынды. 2- типті қант диабеті бар науқастар астенияға бейім. Жалпы астенияның ең жоғары жиілігі 5-тен 10 жылға дейінгі қант диабетімен ауыратын науқастарда кездеседі. Жұмыс істемейтін науқастарда жалпы астения жиілігі жоғары болды. 2- типті қант диабетіне шалдыққан науқастарды жынысы бойынша жалпы және физикалық астениямен салыстыру кезінде елеулі айырмашылықтар анықталды.

Түйінді сөздер: *2- типті қант диабеті, астениялық синдром, MFI-20 астенияны бағалау шкаласы, шаршау, психологиялық жағдай.*

Дәйексөз үшін:

Зиналиева А.Н., Дильмагамбетова Г.С., Сартаева А.Ш., Баспакова А.М., Бегалина Д.Т., Ахметжанова М.Б., Молдашева З.Б., Тулеуова А.М., Исемгалиева Д.Р., Умбетова А.А., Таушанова М.К. Ақтөбе қаласында 2 типті қант диабетімен ауыратын науқастардың психологиялық әл-ауқатына астенияның әсері // Ғылым және Денсаулық сақтау. 2025. Vol.27 (5), Б. 127-135. *doi 10.34689/SH.2025.27.5.016*

Introduction

Type 2 diabetes mellitus (T2DM) is currently recognized as a global medical and social problem. The prevalence of type 2 diabetes has reached 10% and is projected to increase to 12.2% of the world's population, which will amount to 783.2 million people. Diabetes ranks among the leading causes of mortality from all diseases [17]. Its complications negatively affect daily life, creating physical, psychosocial, and emotional burdens [12].

Asthenic disorders in the long course of T2DM are an integral part of the disease's manifestation. Asthenia in patients with type 2 diabetes is a complex and multifaceted phenomenon that affects both the physical and psycho-emotional state of the patient. This condition of fatigue and weakness often develops against the background of chronic hyperglycemia, metabolic disturbances, and the consequences of comorbid diseases. Patients report decreased work capacity, persistent fatigue, and a lack of energy, which can significantly impact their quality of life. Asthenia may be associated with sleep disturbances, depression, and anxiety, which further exacerbate the symptoms [4]. It has been established that the asthenic syndrome in T2DM often has a moderate character, and its severity increases in individuals with disease onset after the age of 30 and a disease duration of five years or more [2]. Anxiety-depressive disorders caused by hyperglycemia contribute to the progression of macroangiopathy and neuropathy, creating a vicious circle of complications [1].

One of the important characteristics of the patient profile with type 2 diabetes mellitus is low adherence to treatment. Most patients, due to insufficient knowledge, may skip medication doses, violate dietary recommendations, and limit physical activity. This leads to chronic hyperglycemia and predisposes patients to asthenia or fatigue. Fatigue, in turn, as a potentially exhausting and debilitating condition, represents a serious barrier to self-care [8].

A recent study found that patients with non-comorbid diabetes experience less fatigue compared to those with comorbid conditions [9].

The appearance of asthenic symptoms is considered a signal of self-intoxication by metabolic by-products and impaired regulation of the body's energy production and utilization [18].

Patients with diabetes were found to have higher fatigue scores using the Multidimensional Fatigue Inventory (MFI) compared to non-diabetic individuals, regardless of insulin treatment [16]. Moreover, when using various fatigue assessment scales, diabetic patients generally showed higher fatigue levels compared to non-diabetic subjects [17]. Type 2 diabetes mellitus is also associated with impaired cognitive function [5].

Kazakhstani researchers have established that poor psychological well-being negatively affects a person's ability to manage diabetes, reduces treatment adherence, and increases the risk of complications. However, asthenia among patients with diabetes mellitus in Kazakhstan remains an insufficiently studied issue.

Aim: to study the susceptibility to asthenia in patients with type 2 diabetes mellitus in Aktobe.

Materials and Methods

The study design was a cross-sectional clinical study without a control group. Inclusion criteria: the ability for autonomous behavior, provision of informed consent, and voluntary participation in the study. Exclusion criteria: type 1

diabetes, gestational diabetes, and other specific forms of diabetes; children and pregnant women; severe acute and chronic diseases; severe psychological impairment and absence of depression; respiratory failure; tumors and other severe conditions; participation in other studies.

The study population consisted of 1500 patients with type 2 diabetes mellitus registered for follow-up care in state polyclinics of the city of Aktobe, aged 18 to 70 years. A detailed characterization of the participants by age, education, and family income is presented in Table 1.

Table 1.

Quantitative sample of patients with type 2 diabetes mellitus in Aktobe.

Indicators	Age	18-44	8%
		45-59	34%
		60-70	58%
	Education	high	44%
		secondary specialized	33%
		secondary	23%
	Family income	up to 50 thousand per month	2%
		50–100 thousand per month	35%
		above 100 thousand	63%

Out of 1500 patients, there were 881 women and 619 men. The majority of respondents were aged 60-70 years (58% of the total), with the average age of participants being 62 years. By education level: higher education (33%), secondary specialized (43.56%), and secondary education (23.4%). Family income above 100 thousand was reported by 63% of respondents.

For self-assessment, the MFI–20 (The Multidimensional Fatigue Inventory) scale was used. The scale was developed by Dutch scientists *E. Smets, B. Garssen, B. Bonke, and J. Haes* and is a valid tool for measuring asthenia in the general population [15]. If the total score on one of the subscales is higher than 12, this may serve as a preliminary basis for diagnosing “asthenic syndrome.”

The survey was conducted by specially trained medical professionals. The results of the survey made it possible to combine the obtained data into homologous semantic groups - profiles reflecting various characteristics of the severity or absence of asthenia indicators. Below, in Table 1, the key and explanations of asthenia indicators are presented.

Table 2.

Key to the subjective asthenia assessment scale.

№	Indicators of asthenia	Question numbers of the scale	Scores
1	General asthenia	1, 5, 12, 16	
2	Reduced activity	3, 6, 10, 17	
3	Decreased motivation	4, 9, 15, 18	
4	Physical asthenia	2, 8, 14, 20	
5	Mental asthenia	7, 11, 13, 19	

The present work is part of the scientific research project of West Kazakhstan Marat Ospanov Medical University: “Personalized approach to diet therapy in patients with type 2 diabetes mellitus in the context of primary health care.” Approval was obtained from the Local Ethics Committee of West Kazakhstan Marat Ospanov Medical University on 19.11.2021, protocol №9.

Statistical processing was carried out using SPSS (Statistical Package for the Social Sciences) version 25 for Windows. Descriptive statistics, including medians, interquartile ranges (IQR), frequencies, and percentages, were used to characterize demographic and clinical variables. The normality of data distribution was tested using the Shapiro–Wilk test, and since most variables did not meet the criteria for normal distribution ($p < 0.05$), nonparametric methods were used for further analysis. The Pearson χ^2 test was applied to analyze differences in the frequency of categorical variables. The Mann–Whitney test was used to assess differences between men and women in various aspects of asthenia. Correlation analysis with Spearman’s coefficient was conducted to evaluate associations between age and different aspects of asthenia. All tests were two-tailed, and results were considered statistically significant at $p < 0.05$ and $p < 0.001$. Statistical analysis was performed using SPSS software version 25.0.

Results

Based on the results of our questionnaire, we obtained the following findings. Table 3 shows the differences between women and men across several parameters of asthenia (weakness and fatigue). The indicators of general asthenia were as follows: median in women - 11 (Q1-Q3: 8-12), in men - 10 (Q1-Q3: 8-12) ($p = 0.052$). The difference between women and men is insignificant, although close to the 0.05 threshold. For reduced activity, the median was the same (11) in both sexes ($p = 0.254$), indicating no significant differences. Decreased motivation showed the following results: median in women -10 (Q1-Q3: 8-12), in men - 10 (Q1-Q3: 7-12) ($p = 0.746$), no significant differences were found. Physical asthenia: in women the median was 11 (Q1-Q3: 9-13), in men - 11 (Q1-Q3: 9-12) ($p = 0.046$), which indicates a significant difference between sexes. Mental asthenia: median in women - 10 (Q1-Q3: 9-12), in men - 10 (Q1-Q3: 8-12) ($p = 0.351$), no significant differences were identified.

When analyzing the MFI–20 asthenia assessment scale in Table 3, it can be seen that the mean self-assessment value indicates a tendency toward deterioration in each of the five indicators of psychophysical health in patients with type 2 diabetes of both sexes, but higher scores were observed in women. It can also be concluded that the burden of the disease negatively affects the psychophysical state of the individual, contributing to the development of general asthenia and physical asthenia in both men and women. Thus, when comparing two independent groups (men and women) using the Mann–Whitney test, statistically significant differences were found for the indicators of general and physical asthenia ($p < 0.01$ for each indicator).

Table 3.

Quantitative analysis of self-assessment of patients with type 2 diabetes mellitus by gender using the MFI–20 scale.

Indicator	Gender of the participants				p value
	Female (n=881)		Male (n=619)		
	Me	Q_1-Q_3	Me	Q_1-Q_3	
General asthenia	11	8-12	10	8-12	0,052*
Reduced activity	11	9-13	11	9-13	0,254
Decreased motivation	10	8-12	10	7-12	0,746
Physical asthenia	11	9-13	11	9-12	0,046*
Mental asthenia	10	9-12	10	8-12	0,351

We analyzed (Table 4) the effect of diabetes duration on the manifestations of general asthenia. Only for the indicators of general asthenia, out of 1500 respondents, 1480 answered: among them, of 573 patients with diabetes lasting up to 5 years, 204 cases of general asthenia were identified; out of 681 patients with diabetes lasting 5-10 years, 296 cases; and among those with a disease duration of more than 10 years (233 patients), 87 cases of general asthenia were revealed. In all three surveyed groups, scores of ≤12 were obtained, reflecting the presence of asthenic syndrome.

Table 4.

Comparison of general asthenia in patients with type 2 diabetes mellitus with diabetes duration.

Duration of diabetes	number of general asthenia		p
	A6c. / n	%	
up to 5 years	204 / 573	35,6	0,014*
5–10 years	296 / 681	43,5	P_{1-2} = 0,014*
more than 10 years	87 / 233	37,3	

* - differences in indicators are statistically significant (p <0,05)

When comparing the frequency of general asthenia in the two groups with disease duration up to 5 years and from 5 to 10 years, statistically significant differences were found (p = 0.014). Patients with diabetes lasting 5 to 10 years had the highest frequency of general asthenia (43.5%), which was statistically significantly different from the group of patients with a diabetes duration of up to 5 years (35.6%). When assessing the relationship between the frequency of general asthenia and diabetes duration, an insignificant association was revealed (V = 0.076).

Analysis of employment status (Table 5) showed that employed individuals had a lower frequency of asthenia (32.7%) compared with the unemployed (44.5%) and pensioners (42.3%). The differences between employed and other groups (unemployed and pensioners) were statistically significant (p < 0.05). Employed people overall were less prone to general asthenia compared with the unemployed and pensioners.

Table 5.

Comparison of general asthenia with diabetes status.

Employment status	Frequency of General Asthenia		p
	Abs. / n	%	
employed	167 / 510	32,7	0,001*
unemployed	106 / 238	44,5	P_{1-2} = 0,003*
pensioner	302 / 713	42,3	P_{1-3} = 0,002*

* - differences in indicators are statistically significant (p <0,05)

When comparing the frequency of general asthenia depending on the employment status of the participants, statistically significant differences were found (p = 0.001). The identified differences were due to the higher frequency of general asthenia among the unemployed compared with the employed (p = 0.003) and between the unemployed and pensioners (p = 0.002). A weak association was noted between the compared characteristics (V = 0.1).

We conducted a Spearman correlation analysis between types of asthenia and the age of patients with type 2 diabetes mellitus. The graph shows the relationship between general asthenia (X-axis) and age (Y-axis) (Figure 1).

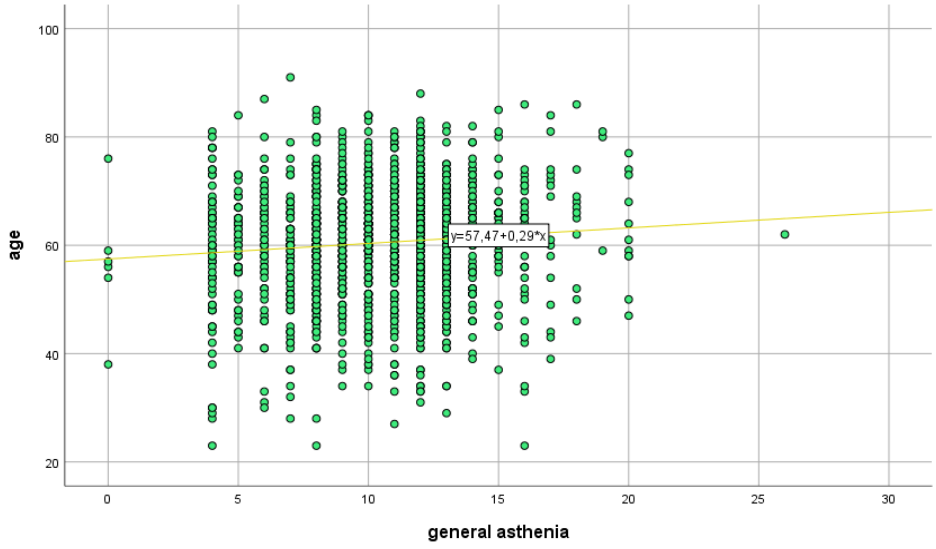

Figure 1. Correlation between general asthenia and age in patients with type 2 diabetes mellitus.

The dots represent individual observations, showing the level of general asthenia and the age of respondents. The trend line demonstrates the overall tendency of the relationship between age and the level of asthenia: as age increases, general asthenia rises. In our study results, general asthenia was weakly associated with age, which is evident from the slight slope of the trend line.

Figure 2 shows the relationship between the level of reduced activity and age. The trend line demonstrates the tendency of age dependence on reduced activity. The equation of the trend line indicates that reduced activity and age are weakly associated, since with an increase in the level of reduced activity, age increases only slightly.

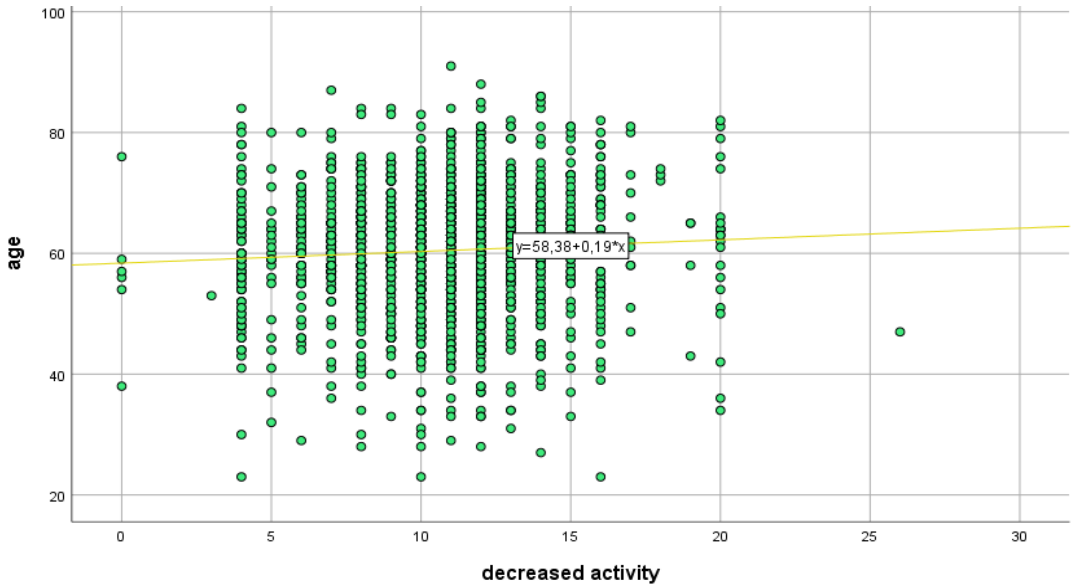

Figure 2. Correlation between decreased activity and age in patients with type 2 diabetes.

Figure 3 shows the relationship between the level of decreased motivation and age. An increase in the level of decreased motivation is associated with a slight increase in age, indicating a weak correlation.

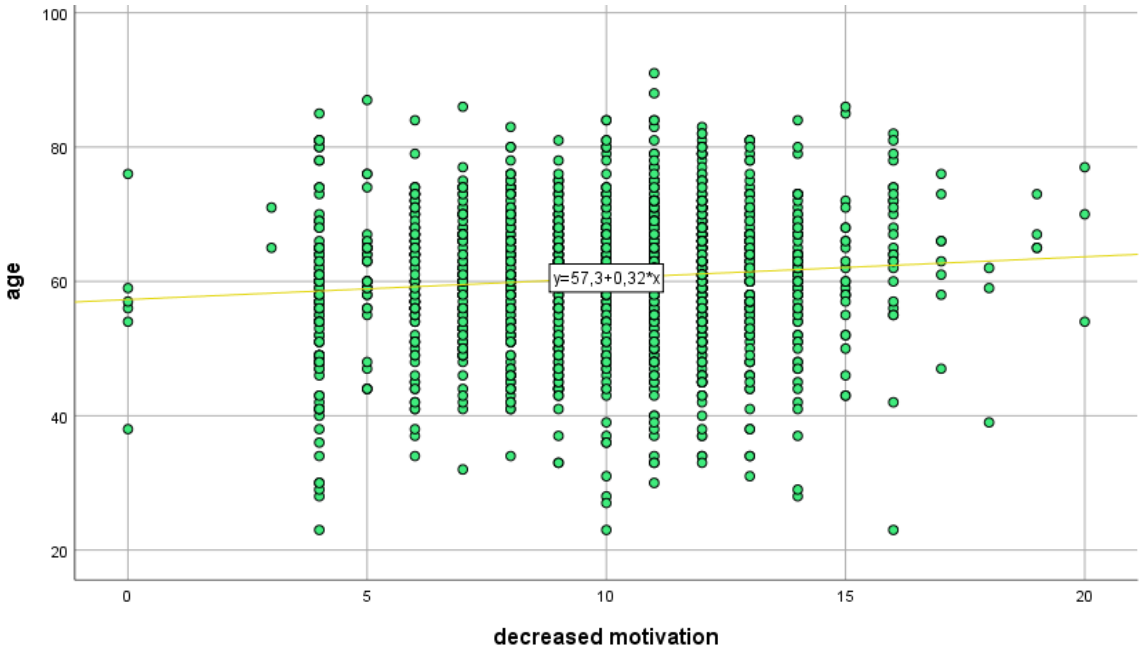

Figure 3. Correlation between decreased motivation and age in patients with type 2 diabetes.

Figure 4 shows the relationship between the level of physical asthenia and age. An increase in physical asthenia is associated with a slight increase in age; however, this relationship is rather weak.

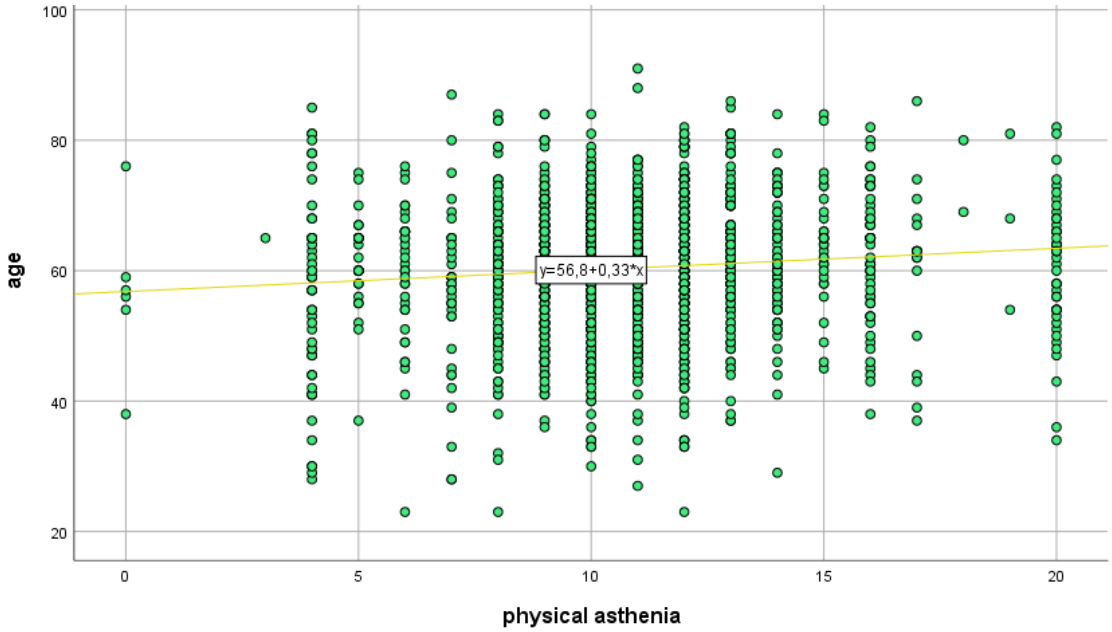

Figure 4. Correlation between physical asthenia and age in patients with type 2 diabetes mellitus.

Figure 5 shows the relationship between the level of mental asthenia and age. An increase in the level of mental asthenia is associated with a slight increase in age; however, this relationship is very weak and most likely insignificant for practical conclusions.

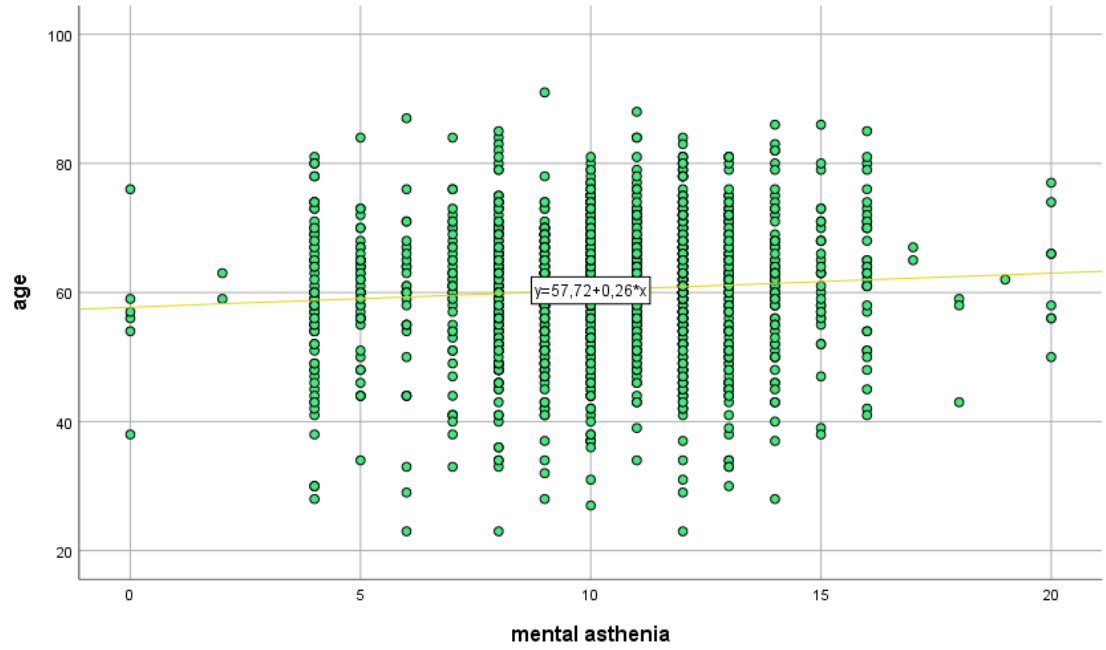

Figure 5. Correlation between mental asthenia and age in patients with type 2 diabetes mellitus.

Statistically significant direct correlations were also established between the age of patients with type 2 diabetes mellitus and types of asthenia: with general asthenia (rxy = 0.083; p = 0.001); reduced activity (rxy = 0.067; p = 0.010); decreased motivation (rxy = 0.089; p = 0.001); physical asthenia (rxy = 0.103; p = 0.000); mental asthenia (rxy = 0.067; p = 0.011).

Discussion

Based on the data analysis, we identified and described the psychological state of patients with type 2 diabetes mellitus. Each profile has its own characteristics that define susceptibility to asthenia. It is important to emphasize the significance of understanding asthenia, given its adverse consequences.

The duration and complications of type 2 diabetes are usually characterized by increased fatigue, impaired daily activities, and reduced productivity. Asthenia does not arise solely from physical fatigue or only from mental strain, etc. It may be caused by objective reasons, and most often they have a psychogenic nature. Asthenic disorders in the long course of T2DM are an integral part of the disease manifestation. With increasing duration of T2DM, cognitive

dysfunction progresses, while disease decompensation accelerates this process.

The symptoms of asthenia in T2DM mainly manifest in physical and psychological aspects. For example, patients experience weakness and low activity, cognitive impairments, and negative emotions, which seriously affect their daily lives and weaken normal functional activity [11]. Fatigue, including mental and physical exhaustion, is a common clinical symptom and is defined as a subjective perception of reduced ability to perform physical and intellectual tasks [6].

Chronic fatigue affects diabetes self-management, exerting a negative impact on daily functioning and well-being [2]. The prevalence of fatigue in patients with T2DM may be associated with various contributing factors, including socio-demographic aspects, clinical disease, inflammatory factors, psychological stress, as well as behavior and lifestyle [20].

With advancing age, the prevalence of type 2 diabetes increases significantly, also facilitated by the rising life expectancy of the population. In this regard, the management of patients with T2DM not only of elderly but also of senile age deserves special attention [13]. Patients with T2DM in older age groups much more frequently exhibit cognitive impairments than elderly individuals without this disease. These usually manifest as rapid fatigability, inadequate emotional reactions, impaired memory and attention, slower acquisition of new skills, etc. It has been established that further progression of cognitive dysfunction is influenced by the duration of T2DM, poor glycemic control, hypoglycemia, and social determinants of poor diabetes management [19]. Older patients significantly limit their activity, as they tire more quickly than younger patients, which causes distress, frustration, and ultimately depression.

In our study, although marital status was not examined, it is one of the predisposing factors of fatigue, which could influence its severity. Support provided by family members to patients with T2DM is very important due to the various limitations of the disease. Patients living in a family environment demonstrate significantly lower levels of fatigue, primarily thanks to the assistance they receive in daily life [3]. In contrast, patients living alone cannot share the burden of the disease or express their concerns to other family members. Thus, attempts to cope with the disease independently lead to increased levels of fatigue [7,14]. However, there are currently no unified recommendations for identifying and preventing fatigue or its clinical consequences in T2DM.

The prevalence of fatigue in patients with T2DM may be associated with various contributing factors, including socio-demographic aspects, clinical disease, inflammatory factors, psychological stress, as well as behavior and lifestyle. Considering these contributing factors, appropriate measures should be taken. For example, medical personnel should pay close attention to the patient's physical health, such as BMI, blood glucose levels, and other objective indicators, to monitor their condition.

One of the important components of therapy for patients with diabetes mellitus is adherence to treatment. It is known that most patients, due to insufficient knowledge, may skip medication doses, violate dietary recommendations, and avoid physical activity, which leads to chronic hyperglycemia and may predispose patients to asthenia [10].

Conclusions:

Patients with type 2 diabetes mellitus are susceptible to asthenia. The highest frequency of general asthenia is observed in patients with a diabetes duration of 5 to 10 years. A higher frequency of general asthenia was found among unemployed patients. Significant differences were established when comparing male and female patients with T2DM in terms of general and physical asthenia.

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Contribution of the authors:

Conceptualization: *Zinalieva A.N., Dilmagambetova G.S., Sartayeva A; methodology: Baspakova A.M;*

formal analysis: *Akhmetzhanova M.B., Tuleuova A.M; data processing: Moldasheva Z.B.;*

preparation of the original project: *Zinalieva A.N., Sartayeva A; review and editing: Dilmagambetova G.S.*

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Literature:

1. *Garganeeva N.P. P*sihosocial'nye aspekty saharnogo diabeta 2-go tipa: innovacii profilaktiki // Sibirskij medicinskij zhurnal. - 2011. - № 26 (4), vyp. 2. - S. 121-125

2. *Mihajlovskaya O.G.* Psihopatologicheskie sindromy pri saharnom diabete i ih diagnosticheskoe znachenie // Kachestvennaya klinicheskaya praktika. - 2004. - № 2. - S. 23- 25.- C. 23-25.

3. *Mkrtumyan A.M., Biryukova E.V.* Osobennosti saharnogo diabeta v pozhilom vozraste i principy terapii // Saharnyj diabet. - 2005. - № 4. - S. 14 - 21.

4. *Novoselova M.V., Samojlova Yu.G., Zhukova N.G., Tonkih O.S.* Analiz associativnyh vzaimosvyazej kliniko-metabolicheskih, kognitivnyh narushenij i strukturnyh izmenenij golovnogo mozga u pacientov s saharnym diabetom 1 tipa // V mire nauchnyh otkrytij. - 2014. - № 6 (54). - S. 191-202.

5. *Alkethiri K., Almtroudi T., Jurays A.B., et al.* The relationship between type 2 diabetes mellitus with cognitive functions. Heliyon. 2021 Mar 8;7(3):e06358. doi: 10.1016/j.heliyon.2021.e06358. PMID: 33748460; PMCID:

6. *Assar M.E. et al.* Diabetes and frailty. Current opinion in clinical nutrition and metabolic care. 2019; 22 (1): 52–57. https://doi.org/10.1097/mco.0000000000000535

7. *Badriah S. Sahar.* Family support in caring for older people with diabetes mellitus: A phenomenology study. Enfermería Clínica 2018, 28, 245–249. [Google Scholar] [CrossRef]

8. *Fritschi C., Park C., Quinn L., Collins E.G.* Real-time associations between glucose levels and fatigue in type 2 diabetes: Sex and time effects. Biol. Res. Nurs. 2020, 22, 197–204. [Google Scholar] [CrossRef]

9. *Griggs S., Morris N.S.* Fatigue Among Adults With Type 1 Diabetes Mellitus and Implications for Self-Management: An Integrative Review. Diabetes Educ. 2018 Aug;44(4):325-339. doi: 10.1177/0145721718782148. Epub 2018 Jun 26. PMID: 29944065; PMCID: PMC6372920

10. *Kristianingrum N.D., Ramadhani D.A.; Hayati Y.S.; Setyoadi S.* Correlation between the burden of family caregivers and health status of people with diabetes

mellitus. J. Public Health Res. 2021, 10, 2227. [Google Scholar] [PubMed] 51

11. *Kuo H.J., Huang Y.C., García A.A.* An integrative review of fatigue in adults with type 2 diabetes mellitus: Implications for self-management and quality of life. J Clin Nurs. 2022 Jun;31(11-12):1409-1427. doi: 10.1111/jocn.16058. Epub 2021 Sep 28. PMID: 34585452.)

12. *Lloyd C.E., Brown F.J.* Depression and diabetes. Curr Womens Health Rep. 2002 Jun;2(3):188-93. PMID: 12099194.

13. *Patel M.R.* Social Determinants of Poor Management of Type 2 Diabetes Among the Insured. Curr Diab Rep. 2020 Nov 5;20(11):67. doi: 10.1007/s11892-020-01354-4. PMID: 33150501; PMCID: PMC7641654.

14. *Rekawati E., Hamid A.Y.S., Sahar J., Kamso.S., Kusumawardani L.H.* The effectiveness of the Cordial Older Family Nursing Model in order to improve the quality of family care for older persons. Indian J. Public Health Res. Dev. 2020, 11, 1152–1156. [Google Scholar] [CrossRef]

15. *Smets E.M., Garssen B., et al.* The Multidimensional Fatigue Inventory (MFI) psychometric qualities of an instrument to assess fatigue. J Psychosom Res. 1995; 39(3): 315-25. doi: 10.1016/0022-3999(94)00125-o

16. *Umegaki H., Hayashi T., Nomura H., Yanagawa M., Nonogaki Z., Nakshima H., Kuzuya M.* Cognitive dysfunction: an emerging concept of a new diabetic complication in the elderly. Geriatr Gerontol Int. 2013 Jan;13(1):28-34. doi: 10.1111/j.1447-0594.2012.00922.x. Epub 2012 Aug 6. PMID: 22882533.

17. *van Harten B., Oosterman J., Muslimovic D., et al.* Cognitive impairment and MRI correlates in the elderly patients with type 2 diabetes mellitus. Age Ageing. 2007 Mar;36(2):164-70. doi: 10.1093/ageing/afl180. PMID: 17350976.

18. *Y, Zhang L, Li X, Kan Y, et al.* Contributing factors of fatigue in patients with type 2 diabetes: A systematic review. Psychoneuroendocrinology. 2021 Aug;130:105280. doi: 10.1016/j.psyneuen.2021.105280. Epub 2021 May 19. PMID: 34049018

19. *Yakaryılmaz F.D., Öztürk Z.A.* Treatment of type 2 diabetes mellitus in the elderly. World J Diabetes. 2017;8(6):278−285. https://doi.org/10.4239/wjd.v8.i6.278

20. *Yaxin Bi, Lu Zhang, Xiangning Li, Yinshi Kan, et al.* Contributing factors of fatigue in patients with type 2 diabetes: A systematic review, Psychoneuroendocrinology, Volume 130, 2021, 105280, ISSN 0306-4530, https://doi.org/10.1016/j.psyneuen.2021.105280..

21. *Zheng Y., et al.* Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nat Rev Endocrinol. 2018 Feb;14(2):88-98. doi: 10.1038/nrendo.2017.151. Epub 2017 Dec 8. PMID: 29219149

*** Corresponding Author:**
Zinalieva Ainur Nurlybaevna – Candidate of Medical Sciences, Associate Professor of the Department of General Medical Practice №2 https://orcid.org/0000-0003-0608-0964
Postal address: 030000, Aktobe, Republic of Kazakhstan.
E-mail: zinalieva_ainur74@mail.ru
Phone +7 701 611 96 09