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Peculiarities of the Course of Joint Syndrome in Persons with Type 2 Diabetes Mellitus

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Abstract: Review. Currently, the problem of diseases of the musculoskeletal system and diabetes mellitus is characterized by an increase in medical and social importance, especially among the aging population. The International Diabetes Federation (IDF) predicts that if growth continues to accelerate, the total number of people with diabetes will surpass 435 million by 2030.Diabetes mellitus is characterized by a violation of all types of metabolism, which, of course, affects the course of diseases with damage to the musculoskeletal system. This is due to the fact that glucose is the main energy substrate for chondrocytes. Therefore, the problem of the relationship between diabetes mellitus and chronic joint diseases such as osteoarthritis, osteoporosis, rheumatoid arthritis is quite relevant today.

The study was carried out on the basis of the regional endocrinological dispensary of the Bukhara region of the Republic of Uzbekistan. The study involved 13 men and 45 women who were examined and treated in this hospital. The patients were divided by age: the mean age of men was 60 ± 8.6 years, and women were 67 ± 10 years old. Type 2 diabetes mellitus aggravates the course of articular syndrome in patients with combined pathology. The presence of type 2 diabetes mellitus in a patient with articular syndrome leads to increased pain syndrome, deterioration of joint function, and a higher frequency of secondary synovitis. Severe decompensation of carbohydrate metabolism (HbA1c> 10%) is associated with increased pain syndrome, more pronounced functional disorders and inflammatory changes in the joints in patients with articular syndrome in combination with type 2 diabetes mellitus.

Keywords: diabetes, glycated hemoglobin, hypertension, osteoarthritis, osteoporosis, rheumatoid arthritis.

Relevance. At present, the problem of diseases of the musculoskeletal system and diabetes mellitus is characterized by an increase in medical and social significance, especially among the aging population [10].The International Diabetes Federation (IDF) predicts that, if growth continues to accelerate, the total number of people with diabetes will surpass 435 million by 2030. The regions with the highest prevalence are North America (10.2% of the adult population), followed by the Middle East and North Africa with 9.3% [1.7].

In the world, every 5 seconds someone develops diabetes, and every 7 seconds someone dies from this disease. Diabetes mellitus already has the "title" of the 21st century non-infectious epidemic. Research in recent years suggests that the incidence is higher in low- and middle-income countries, and that it is mainly people of working age that are affected. In 1985, 30 million people worldwide

suffered from diabetes; 15 years later, this number exceeded 150 million. Today, in less than 15 years, the number of cases is about 400 million people (50% of which are people 20-60 years old). At the beginning of 2014, 3.96 million people were diagnosed with diabetes in Russia, but the actual figures are higher. According to unofficial data, the number of patients is more than 11 ml [10].

Diabetes mellitus is characterized by a violation of all types of metabolism, which, of course, affects the course of diseases with damage to the musculoskeletal system. This is due to the fact that glucose is the main energy substrate for chondrocytes. Therefore, the problem of the connection between diabetes mellitus and chronic joint diseases such as osteoarthritis, osteoporosis, rheumatoid arthritis is quite relevant today [10].Osteoarthritis (OA) and type 2 diabetes mellitus (T2DM) are among the most common diseases among elderly and senile people, therefore, the combination of these diseases is widespread among people of this category [2, 12]. Diabetes mellitus introduces into the clinical picture of OA a greater severity of cartilage degeneration, a distinct periarticular inflammatory process and a decrease in the performance of the thigh muscles, which is mainly associated with the development of late diabetic complications of macro- and microangiopathy, sensorimotor neuropathy) [2, 9, 11, 14, 14-16].

The literature data on the frequency and severity of articular syndrome depending on the duration and degree of compensation of DM2.A number of authors note the presence of deeper osteoarticular disorders in patients with long-term, poorly controlled diabetesA number of authors note the presence of deeper osteoarticular disorders in patients with long-term, poorly controlled diabetes.A number of studies have noted a high incidence of type 2 diabetes in patients with OA from 4.3% to 12.7% of people relatively young middle age (Denko C. W, Malemud C. J., 2005; Korochina I. E., 2006).It was found that with an increase in the age of patients with gonarthrosis 1.3 times, the number of concomitant diseases increases 1.7 times, with this type 2 diabetes, obesity, arterial hypertension met 2 times more often (Schellevis F.G., 2006). Thus, type 2 diabetes in combination with rheumatic diseases, especially with osteoarthritis and osteoporosis, is now quite common. Some issues of the peculiarities of the course of articular syndrome have not been sufficiently studied, which makes this topic relevant for research.

Goal. To study the influence of diabetes mellitus on the clinical course of the articular syndrome.

Materials and methods. The study was carried out on the basis of the regional endocrinological dispensary of the Bukhara region of the Republic of Uzbekistan. The study involved 13 men and 45 women who were examined and treated in this hospital. The patients were distributed by age (Table 1)

Table 1 Distribution of patients by age

Sex	Patientage			
	< 60 yers old	> 61 yers old	Total	
	abs	abs	abs	%
men	5	8	13	22,41
women	12	33	45	77,58
Total	18 (31,03%)	40 (68,96%)	58	100

The table shows that the largest number of patients was observed over the age of 60 years (68.96%). The average age of men is 60 ± 8.6 years, and women are 67 ± 10 years.

The patients underwent clinical blood tests, biochemical blood tests. Also, 24 patients underwent radiographs of the affected joints.

The main biochemical parameters determined in this group of patients were: fasting blood glucose and glycosylated hemoglobin.The degree of compensation for type 2 diabetes in terms of HbA1c and glucose was assessed according to the criteria of the European Diabetes Association (Table 2).

Table 2

Index	Compensation		
	good (compensation)	satisfactory (subcompensation)	unsatisfactory (decompensation)
Level glucose in blood (mmol / l) - fasting	4,4-6,1	6,2-7,8	>7,8
HbA1c (%)	<6,5	6,5-7,5	>7,5

Type 2 diabetes was diagnosed according to the WHO classification of diseases (2006/2011).The average duration of type 2 diabetes was 12 ± 8.3 years, and the average duration of articular syndrome was 8 ± 7.4 years. The average plasma glucose level was 14 ± 5.5 mmol / L, and the average HbA1c level was 7.2 ± 0.6%. The research part included direct questioning of patients, as well as analysis of medical records.The selection criteria were:

- the presence of diagnosed type 2 diabetes;
- the presence of manifestations of articular syndrome (pain, stiffness in the joints, crepitus, inflammation, limitation of joint mobility).

Patients with type 1 diabetes and other specific types of diabetes, oncological diseases, persons with OA IV X-ray stage were excluded from the study.

In the course of the study, the data of the anamnesis were studied and the subjective assessment of the severity of pain was determined according to the 5-point scale of Frank et al. (Table 3).

Table 3 5-point verbal pain rating scale (Frank A. J. M., Moll J. M. H.,Hort J. F., 1982)

The nature of the pain	балл
Nopain	0
Weakpain	1
Moderatepain	2
Strongpain	3
Veryseverepain	4

Articular syndrome was assessed for the following complaints:

- pain in the joint (joints), spine;
- stiffness in the joint (s), spine - when moving in the morning or after a period of rest;
- crepitus in the joint area;
- limitationofjointmobility;
- signs of joint inflammation (including a history)

Also, 20 patients underwent instrumental examination - an X-ray of the affected joints or an ultrasound examination of the affected joints, as well as dual-energy X-ray absorptiometry of 3 regions (lumbar spine, proximal femur and distal forearm bones).

The data obtained were processed on a personal computer using MSexcel 2010 software.

To assess the results, the arithmetic mean with standard deviation (M ± m) was used.

When comparing the frequencies of a qualitative feature characterizing its distribution in the study groups, the criterion of compliance ($\chi 2$) was used.

Comparison of two independent samples was carried out using the nonparametric Student test. The criterion for the statistical reliability of the conclusions was considered the value generally accepted in medicine $p < 0.05$.

Research results and discussion.

The results of the obtained data show that, in all examined patients, the articular syndrome manifested itself in the form of monoarthritis and polyarthritis with damage to both large and small joints (Table 4).

Table 4 Frequency of joint damage in men and women with type 2 diabetes

Localization	Men		Women		Total	
	(n=13)	%	(n=45)	%	(n=58)	%
Hipjoints	2	15,4	11	24,4	13	22,4
Kneejoints	6	46,1	38	84,4	44	75,9
Anklejoints	1	7,69	5	11,1	6	10,3
Shoulderjoints	5	38,5	2	4,4	7	12,1
Handjoints	2	15,4	4	8,9	6	10,3
Footjoints	-	-	1	2,2	1	1,72
Spine	-	-	4	8,9	4	6,9

Depending on the degree of compensation for type 2 diabetes by HbA1c (Fig. 3) and by the level of fasting plasma glucose (Fig. 4), the patients were divided into 3 groups: with compensated, with subcompensated and decompensated diabetes.

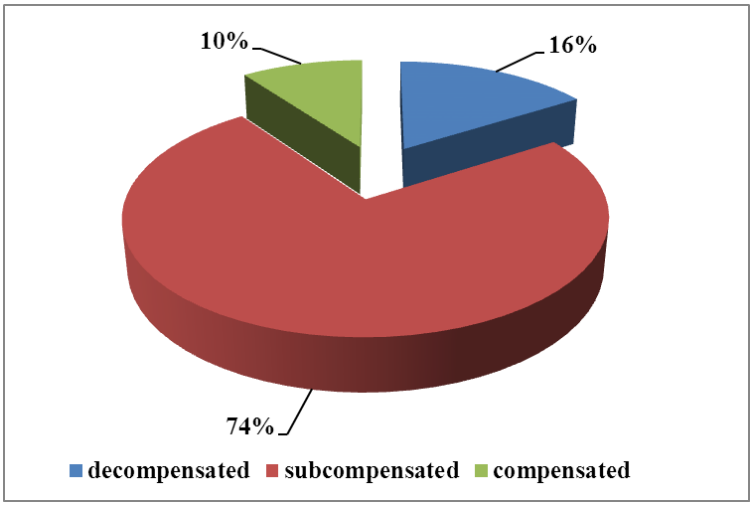


Figure. 3 Degrees of compensation for type 2 diabetes in terms of HbA1c

The data in Fig. 3 indicate the prevalence of patients with subcompensated type 2 diabetes (76%). 14% of patients had decompensated type 2 diabetes, and 10% had compensated type 2 diabetes.

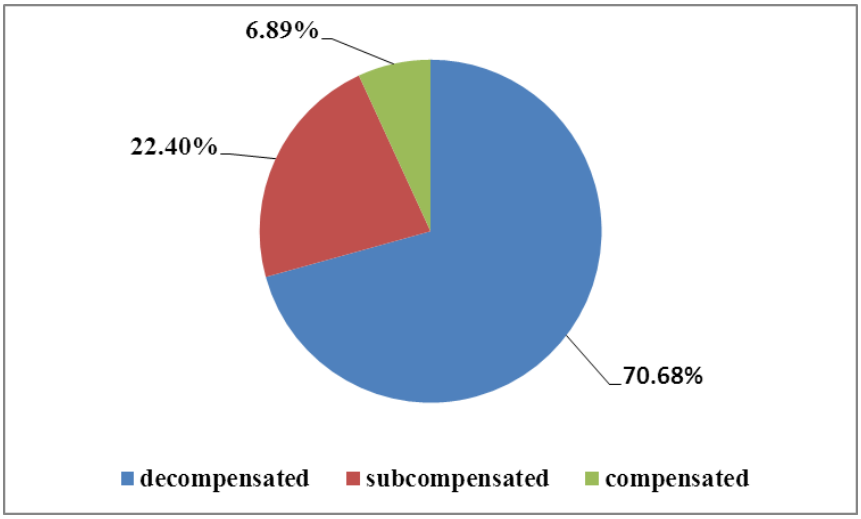


Figure 4. The frequency of compensation for type 2 diabetes, depending on the level of plasma glucose.From the data in Fig. 4 in terms of glucose levels, most patients had decompensated type 2

diabetes (70,68%), 22,4% - subcompensated, and 6,89% - compensated type 2 diabetes. Further, the intensity of joint pain was studied.

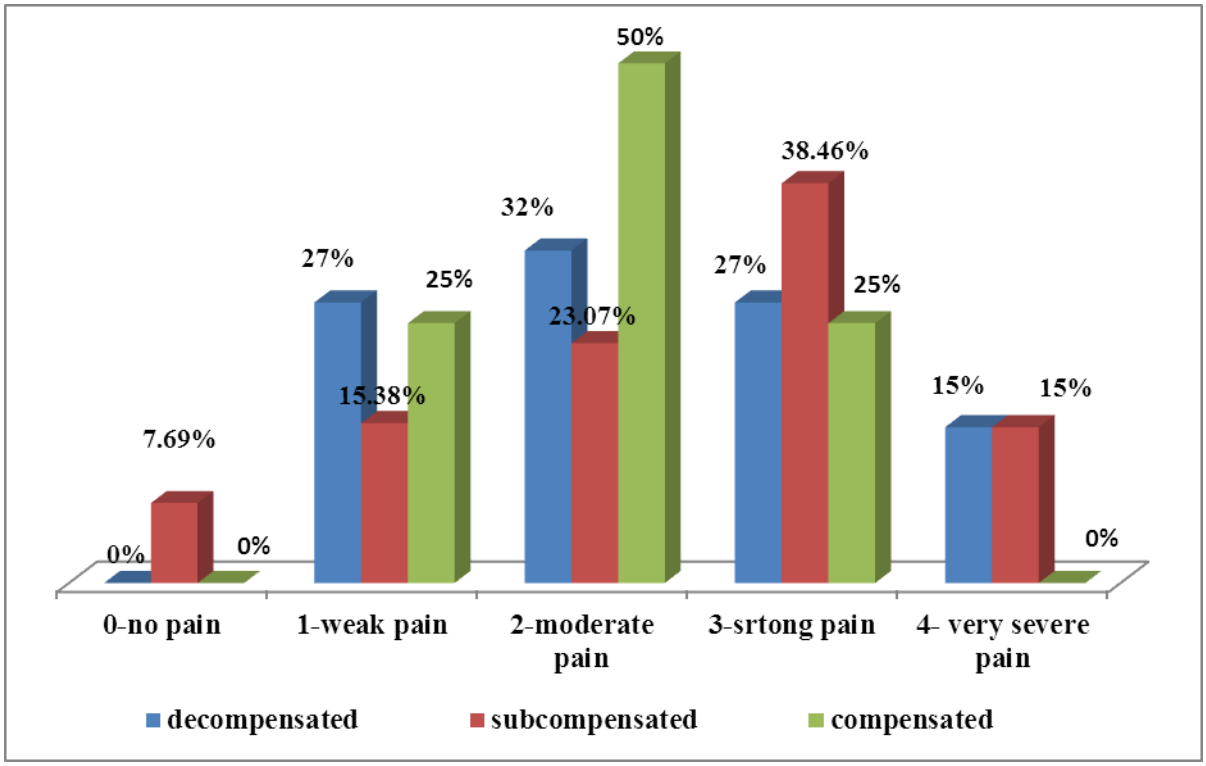
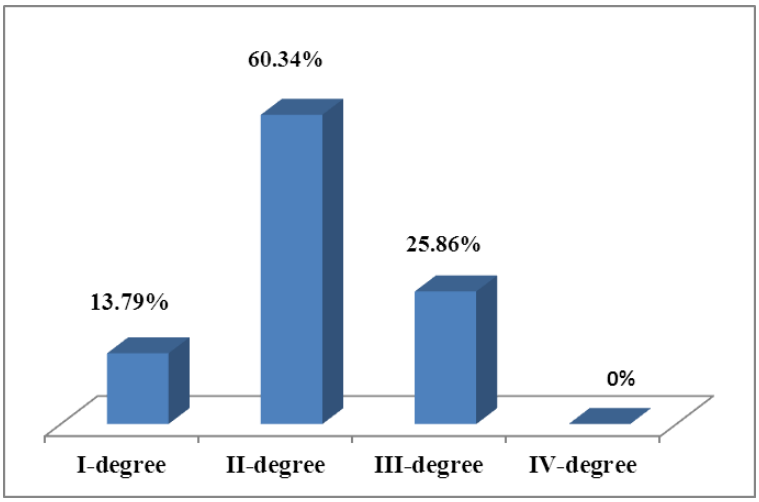


Figure: 5 Severity of pain syndrome depending on compensation of type 2 diabetes

From fig. 5 it follows that in patients with compensated diabetes, complaints of moderate pain (50%) predominated and there were no complaints of very severe pain.In the group with subcompensated type 2 diabetes, patients with a pain score of 3 points (38,46%) prevailed and slightly less patients with a score of 2 points (27,07%). 15,38% had complaints of mild pain and 7,69% of patients did not complain at all of pain in the area of the affected joint.With decompensated diabetes with the same frequency (32%), moderate pain was detected and 27% had severe pain; 15% had very severe pain.In addition, this group did not have patients without pain syndrome, unlike the other two groups.

Night pains were noted in 20% (n=1). In the group with subcompensated diabetes mellitus, night pains were noted in 100% (n=2) patients with 4 points, in 44% (n = 7) patients with 3 points, in 7% (n=1) with 2 points and 20% (n = 5) with 1 point. Also, 67% (n=26) had distal polyneuropathy of the extremities.In the group with decompensated type 2 diabetes, night pains were detected in 14,3% (n = 1), in 75% (n=5) distal polyneuropathy was observed.Nocturnal pains were observed significantly more often ($p < 0.05$) in patients with uncompensated diabetes.

The distribution of the degrees of joint damage by densitometry is shown in fig. 6.



The data in fig. 6 indicate that the majority (60,34%) of patients had grade 2 joint lesions according to X-ray and ultrasound studies.25,86% were diagnosed with grade 3 and in 13,79% -1 degree of joint damage. 4 degree of damage was not detected in the studied group of patients.

The analysis of the frequency of detection of components of the articular syndromewas carried out depending on the duration of the course of type 2 diabetes (Table 5)

Table 5 Frequency of detection of components of articular syndrome depending on the duration of type 2 diabetes

Sign	Duration of type 2 diabetes		
	up to 5 years (n=12) abs (%)	5-10 years (n = 17) abs (%)	>11year (n=29) abs (%)
Pain	12 (100%)	17 (100%)	25 (86,2%)
Stiffness	12 (100%)	17 (100%)	23 (79,31%)
Restrictedmobility	5 (41,6%)	7 (41,17%)	9 (31,03%)
Crepitus	3 (25%)	4 (23,52%)	6 (20,68%)
Synovitis	3 (25%)	3 (17,64%)	1 (3,44%)

From the data table. 5 it follows that for any duration of type 2 diabetes, pain and stiffness in the joints is present in all patients.With a duration of type 2 diabetes up to 5 years, 41.6% had limited mobility in the joints, 25% had reinforcement and 25% had synovitis. With a duration of 5 to 10 years, joint restrictions were noted in 23.52% and synovitis - 17.64%.In the group with a duration of more than 11 years, 31.03% had limited mobility in the joint, 20.68% had reinforcement, and 3.44% had synovitis.

Conclusions.

1. T2DM aggravates the course of articular syndrome in patients with comorbidities.The presence of T2DM in a patient with articular syndrome leads to increased pain syndrome, deterioration of joint function and a higher incidence of secondary synovitis.
2. Severe decompensation of carbohydrate metabolism (HbA1c> 10%) is associated with increased pain syndrome, more pronounced functional disorders and inflammatory changes in the joints in patients with joint syndrome combined with T2DM.

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