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STUDYING THE RELATIONSHIP BETWEEN SLEEP QUALITY AND PAINFUL DIABETIC PERIPHERAL NEUROPATHY IN TYPE 2 DIABETES MELLITUS

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Kalit so'zlar: Qandli diabet 2 tip, diabetik neyropatiya, periferik neyropatiya, neyropatik og'riq, uyqu buzilishi, uyqu sifati, neyropatiya va og'riq, og'riq va uyqu.

Ключевые слова: сахарный диабет 2 типа, диабетическая невропатия, периферическая невропатия, невропатическая боль, нарушение сна, качество сна, невропатия и боль, боль и сон.

Key words: type 2 diabetes mellitus, diabetic neuropathy, peripheral neuropathy, neuropathic pain, sleep disturbance, sleep quality, neuropathy and pain, pain and sleep.

ANNOTATSIYA

Qandli diabet 2 tip bilan og'rigan, diabetik periferik neyropatiyaning og'riqli shakli bilan asoratlangan bemorlarda uyqu buzilishi.

Ushbu maqolada qandli diabet 2 tur (QD 2 tur) bilan og'rigan, diabetik polineyropatiyaning (DPN) og'riqli shakli bilan asoratlangan bemorlarning uyqu sifati o'rganildi. Surunkali og'rig'i bo'lgan bemorlarni 50-80% ida uyqu buzilishlari uchraydi, uyqu buzilishi og'irligi esa og'riqning kuchiga bog'liq. Uyqu buzilishi va neyropatik og'riq o'zaro bog'liq va ular bir vaqtda davolanishi kerak. Uyquni yaxshilash maqsadida uyquga ta'sir ko'rsatuvchi omillardan biri - DPN og'riqli shaklini davolash bemorlarni uyqu sifatini va shu bilan bir qatorda ularaning hayot sifatini yaxshilashga olib keladi.

Neyropatik og'riq va uyqu buzilishlarining o'zaro bog'liqligi ikki tomonlamadir. Neyropatik og'riqli bemorlarda katta extimol bilan uyqu buzilishlari rivojlanadi va ushbu uyqu buzilishlari o'z navbatida og'riqni kuchayishiga olib keladi. Og'riq sezuvchanligi va uyqu buzilishlari o'rtasida musbat bog'liqlik aniqlangan. Surunkali og'riq va uyqusizlik bilan og'rigan bemorlarda og'riqqa chidamlilik kamayishi aniqlangan. Bizning tekshiruvda 120 nafar QD 2 tur bilan ogrigan bemorlar olindi. QD kasalligining davomiyligi 3 yildan 12 yilgacha, tekshirilganlar o'rtacha 56,6±9,8 yoshli, ulardan 79 (65,8%) ayollar va 41 (34,2%) erkaklarni tashkil qildi. Nazorat guruhiga esa 20 nafar QD bilan og'rimagan bemorlar olindi, ulardan 5 (25%) nafarida AG mavjud edi, o'rtacha yoshi esa 55,9±7,5 yosh. Bemorlar uyqu sifati buzilishi bor bo'lgan va uyqu sifati buzlishi yo'q bo'lgan ikki guruhga ajratildi. QD 2 tur bilan og'rigan, DPN ning og'riqli shakli bilan asoratlangan bemorlarning 100% ida uyqu sifatining turli darajada buzilishlari aniqlandi. Bunda 1 guruhdagi bemorlarning eng ko'p bildirilgan shikoyatlari "tungi

uyqudan uyg'ondan keyingi charchoq hissi", ushbu shikoyatni 100% bemorlar bildirdilar, 2 guruhdagi bemorlarda esa faqat 45% bemorlarni tashkil qildi. Bemorlardagi uyquni sifatini belgilaydigan boshqa shikoyatlar ham 1 guruh bemorlarida ustunlik qildi. Bu o'z navbatida DPN og'riqli shakli QD 2 turli bemorlarning uyqu sifatiga ta'siri borligini yana bir bor tasdiqladi.

АННОТАЦИЯ

Изучение нарушения сна у больных сахарным диабетом 2 типа, осложненным болевой формой диабетической периферической нейропатии

В данной статье изучено качество сна больных сахарным диабетом 2 типа (СД2), осложненным болевой формой диабетической полинейропатии (ДПН). Нарушения сна возникают у 50-80% больных с хронической болью, причем выраженность нарушений сна зависит от интенсивности боли. Нарушения сна и нейропатическая боль взаимосвязаны, и их следует лечить одновременно. С целью улучшения сна один из факторов, влияющих на сон - лечение болевой формы ДПН приводит больных к улучшению качества сна и одновременно качества жизни.

Связь между нейропатической болью и нарушениями сна двусторонняя. У пациентов с нейропатической болью с большой вероятностью развиваются нарушения сна, а эти нарушения сна, в свою очередь, приводят к усилению боли. Обнаружена положительная корреляция между болевой чувствительностью и нарушениями сна. Снижение толерантности к боли было обнаружено у пациентов, страдающих хронической болью и бессонницей. В наше исследование были включены 120 пациентов с СД 2 типа. Длительность заболевания составила от 3 до 12 лет, средний возраст обследованных - 56,6±9,8 лет, женщин - 79 (65,8%), мужчин - 41 (34,2%). В контрольную группу вошли 20 пациентов, не страдающих СД, из них у 5 (25%) была АГ, средний возраст составил 55,9±7,5 года. Пациенты были разделены на две группы с нарушениями качества сна и без нарушений качества сна. У 100% пациентов, страдающих СД 2, осложненным болевой формой ДПН, обнаружены нарушения качества сна различной степени. Наиболее частой жалобой пациентов 1-й группы было «чувство усталости после пробуждения от ночного сна», данную жалобу отмечали 100% пациентов, тогда как во 2-й группе — только 45% пациентов. Другие жалобы, определяющие качество сна пациентов, также преобладали у пациентов 1-й группы. Это, в свою очередь, еще раз подтвердило влияние болевой формы ДПН СД 2 на качество сна различных пациентов.

ANNOTATION

Study of sleep disturbances in patients with type 2 diabetes mellitus complicated by a painful form of diabetic peripheral neuropathy

This article examines the sleep quality of patients with type 2 diabetes mellitus (T2DM), complicated by a painful form of diabetic polyneuropathy (DPN). Sleep disturbances occur in 50-80% of patients with chronic pain, and the severity of sleep disturbances depends on the intensity of the pain. Sleep disorders and neuropathic pain are interrelated and should be treated simultaneously. In order to improve sleep, one of the factors influencing sleep, treatment of a painful form of DPN leads patients to improve the quality of sleep and at the same time the quality of life.

The relationship between neuropathic pain and sleep disturbances is bidirectional. Patients with neuropathic pain are more likely to develop sleep disturbances, and these sleep disturbances, in turn, lead to increased pain. A positive correlation was found between pain sensitivity and sleep disturbances. Decreased pain tolerance has been found in patients suffering

from chronic pain and insomnia. Our study included 120 patients with type 2 diabetes. The duration of the disease ranged from 3 to 12 years, the average age of the examined was 56.6±9.8 years, women - 79 (65.8%), men - 41 (34.2%). The control group included 20 patients who did not suffer from diabetes, 5 (25%) of them had hypertension, the average age was 55.9±7.5 years. Patients has been divided into two groups with sleep quality problems and without sleep quality problems. Sleep quality disturbances of varying degrees were found in 100% of patients suffering from type 2 diabetes complicated by the painful form of DPN. The most common complaint of patients of group 1 was "feeling tired after waking up from a night's sleep"; this complaint was noted by 100% of patients, while in group 2 - only 45% of patients. Other complaints that determine the quality of sleep of patients also prevailed in patients of group 1. This, in turn, once again confirmed the influence of the painful form of type 2 DPN on the sleep quality of various patients.

Introduction

According to the International Diabetes Federation, 425 million people worldwide have diabetes [20]. This indicator makes DM a global epidemic of the 21st century [21].

In 2015, 170,000 patients with diabetes were registered in Uzbekistan, and by 2018, more than 230,000 patients were registered and monitored. We can see that the number of people suffering from DM has increased by almost 60,000 in the last 3 years. According to analysis, this indicator may exceed 550 million by 2030 [7,8].

Today, the most common complications of DM are a group of clinical syndromes with damage of the peripheral and autonomic nervous system. Syndromes that cause diffuse and focal damage to the nervous system, commonly known as various forms of neuropathy, occurs in almost half of patients with DM [22].

The most common form of diabetic peripheral neuropathy (DPN) is the painful form of polyneuropathy or neuropathic pain.

Painful DPN can be acute or chronic. For the chronic form of the painful type of DPN, the specific characteristic of pain that pin is wave-form, with periods of remission and aggravation, and that the pain syndrome lasts more than 3 months. The neuropathic pain characterized by daily rhythm of symptoms is: increases to the evening and especially at night. Symptoms can be different: burning, sharp pain, stabbing pain, painful cramping, vein pulling. In most cases, along with the indicated symptoms, sensitivity disorders or lack of sensitivity and decreased or absent reflexes are observed.

And the painless type develops slowly with sensorimotor deficiency, with minimal symptoms in which there is no pain. Typical complaints are related to leg cramps and decreased sensitivity. In the objective view, it is determined decreased various types of sensitivity and reflexes are also decreased or absent.

Damage to nerve fibers in some cases occurs even before the development of other complications of DM, and this can be the first clinical sign of carbohydrate metabolism disorder. Pathological changes in nerves develop at the stage of impaired glucose tolerance, damage to unmyelinated nerve fibers occurs much earlier than the myelinated nerve fibers, and this leads to an increase in disability and even death cases. [7,8].

The modern approach to the treatment of diabetic neuropathy focuses on improving glycemic control, improving lifestyle, and reducing neuropathic pain. The optimal therapeutic approach in patients with DM includes lifestyle modification, with an emphasis on diet and exercise, with optimal control of lipids and arterial blood pressure. Glycemic control with a target of HbA1c < 6% increases mortality in patients with diabetes and has little effect on

diabetic neuropathy, so this indicator is not recommended as a standard of care. As part of a broader approach to good glycemic control, individualized treatment is considered the optimal choice for patients with DM.

Neuropathic pain causes sleep disturbances in patients, and sleep disturbances can in turn be a cause of increased pain. Based on this, it can be said that while treating neuropathic pain, it is necessary to improve sleep quality at the same time. Currently, there is a debate about the use of both pain-reducing and sleep-improving drugs in patients. Anticonvulsants such as pregabalin and gabapentin improve neuropathic pain and comorbid sleep disorders. Opioids and antidepressants reduce pain but do not affect sleep.

Sleep disorders occur in 100% of patients with chronic pain, and the severity of sleep disorders depends on the intensity of pain [4]. Sleep disorders and neuropathic pain are interrelated and should be treated simultaneously [4]. Despite the fact that improving sleep can reduce pain, the main focus of treatment today is on pain reduction [4].

The relationship between neuropathic pain and sleep disorders is bidirectional [5,6]. Patients with neuropathic pain develop sleep disorders with a greater probability, and these sleep disorders in turn lead to increased pain [6]. A positive correlation was found between pain sensitivity and sleep disorders. Decreased pain tolerance was found in patients with chronic pain and insomnia [7]. For example, the clinical evaluation of neuropathic pain after spinal cord injury should include the assessment of sleep quality [8].

The stages of diabetic peripheral neuropathy are listed in the table below.

1-table

Classification of DPNs by degree of severity (DyckP.J.)

stage of DPN	**Characteristic**
0 stage (DPN«-»)	There are no clinical and electrophysiological signs of DPN
1 stage, subclinical (DPN1)	There are no objective neurological signs and symptoms of DPN. In EMG and quantitative autonomic examination 2 changes are detected.
2 stage, clinical (DPN2)	Complaints specific to DPN. There may or may not be signs of sensitivity, movement, autonomic disturbances, weakness of the flexor muscles of the leg (the patient cannot stand on the heels).
3 stage, severe (DPN3)	Neuropathy leading to impaired functioning and/or social adaptation.

The unpredictability of the body's response to drugs that reduce neuropathic pain makes it difficult for doctors to choose and prescribe drugs [9]. Antidepressants, anticonvulsants, tramadol, opioids and other analgesics are used in the treatment of neuropathic pain [9]. Meta analysis and systematic review was conducted [11]. The results of the study revised the NeuPSIG recommendations for the pharmacotherapy of neuropathic pain (tricyclic antidepressants, serotonin and noradrenaline reuptake inhibitors, first-line agents such as pregabalin and gabapentin, and less recommended second-line agents such as lidocaine, caspaisin and tramadol). suggests an output [15].

Newer anticonvulsants such as pregabalin and gabapentin are effective in relieving neuropathic pain and comorbid sleep disorders [24,1]. Patients receiving gabapentin or pregabalin for neuropathic pain reported improved sleep duration and sleep quality, and improved deep sleep and improved depression and anxiety [1,16,19]. Anticonvulsants such as oxcarbazepine, lamotrigine, gabapentin, and pregabalin may be used as second-line agents, such as baclofen (a muscle relaxant and antispastic agent) [19].

Carbamazepine (an anticonvulsant) has been suggested as a first-line treatment for trigeminal neuralgia [10]. The benefits of pregabalin, gabapentin, venlafaxine, duolexetin, tricyclic antidepressants and opioids have been proven in the pain of diabetic neuropathy [2,3,9,13].

Opioids should be used cautiously for pain relief, but not for sleep disorders. In addition, during the use of opioids, sleep breathing disorders such as central sleep apnea have developed.

In another case, opioid receptor agonists were observed to improve pain in symptomatic dysesthesia and restless legs syndrome, which may affect sleep [14]. Antidepressants may help patients with pain-related sleep disorders and chronic pain in both depressed and non-depressed patients [18]. But tricyclic antidepressants, serotonin, norepinephrine reuptake inhibitors, special serotonin reuptake inhibitors can increase restless leg syndrome [12].

Sleep disorders are considered as serious problem for patients with DPN, because sleep disorders and comorbidities can influence the development of type 2 DM.

Diabetic neuropathy causes a significant deterioration in quality of life, especially if patients also have sleep disorders. Indeed, patients with diabetic neuropathy have a poorer quality of life than patients without neuropathy, and this difference begins and persists years before the diagnosis of neuropathy.[17]

Neuropathic pain is closely related to sleep disorders, and physicians must consider both aspects in treatment.

The purpose of the research. Study of sleep quality in patients with type 2 diabetes, complicated by painful type of diabetic peripheral neuropathy

RESEARCH MATERIALS AND METHODS

The clinical study was conducted at the base of the TMA multidisciplinary clinic, in the 2nd department of therapy and endocrinology. 120 patients with type 2 DM were examined: fasting and postprandial glycemia, glycated hemoglobin (HbAlc), lipid profile. Patients with type 2 DM also had cardiovascular diseases, 70% of them had hypertensive disease, 45% had ischemic heart disease. The duration of DM disease was from 3 to 12 years, the average age of the examined was 56.6±9.8 years, of which 79 (65.8%) were women and 41 (34.2%) were men. The control group included 20 adult patients without DM, 5 (25%) of them had AD, and the average age was 55.9±7.5 years.

Electrocardiogram, EchoCG, ABP tests were performed among the instrumental tests. Blood glucose control was carried out by a biochemical method (SPINREACT, S. A. U. kit). Glycated hemoglobin (HbA1c) was also tested by biochemical method (FILTERSAMPLER kit). Lipids (UX, TG, XS-LDL, XS-HDL) were determined by biochemical method (SPINREACT, S. A. U. kit).

Standard methods of diagnosis of DPNs proposed in San Antonio in 1998 were used to evaluate the results of patient complaints and examinations. Accordingly, we used the following widely used scales: TSS (TotalSymptomsScore)-D. An estimate of the number of patients' complaints on the last day proposed by Ziegler. In this scale, each typical positive neuropathic

symptom is evaluated (stabbing pain, tingling, burning, paresthesias), intensity and frequency of symptoms in the last 24 hours are also evaluated. The evaluation scores of all 4 symptoms were summed. When evaluated according to the TSS scale, the scores were estimated in the interval from 0 to 14.64. Neurological changes during the clinical examination were assessed using the NIS-LL (neuropathic changes in the legs) scale[1,24], which includes: muscle strength, reflexes, tactile sensitivity (5 and using a 10-gram monofilament), pain (using a needle on the back surface of the distal phalanx of the big toe), vibration sensitivity (using a tuning fork with a frequency of 128 Hz, divided into 8-point scale on the back surface of the big toe three times, and the average value was determined), determination of muscle-joint sensitivity in the joints of the distal phalanges of the big toes. Temperature sensitivity was measured using Thioterm (a cylinder with one end of glue and one end of metal) on the back surface of the big toes of both feet. During the examination, the patient's skin temperature was at least 32°C. NIS LL scale scores were calculated by summing the right and left legs and all scores. The maximum indicator of negative neuropathy symptoms was 28 points on the NIS LL scale.

The Questionnaire "Pittsburgh Sleep Quality Index (PSQI)" was used as a sleep evaluation tool [16]. The Pittsburgh Sleep Quality Index Questionnaire was developed to assess the quality of sleep during the last month. The questionnaire consists of 19 items, which evaluate sleep through 7 components: subjective sleep quality, sleep latency, sleep length, subjective assessment of sleep sufficiency, sleep disorders, use of sleep-inducing drugs, disturbances in daily activities. This survey is very easy to use and takes 5-10 minutes to complete.

The sum of points can be from 0 to 20: from 0 to 5, the quality of sleep is considered good, and scores of 6 and above indicate poor quality of sleep. This scale has high sensitivity and specificity.

The obtained data are presented in the form of percentage ratio or average error (M±m). Statistical processing of the data was carried out using the STATISTICA (version 9.0) program in the Windows system. Correlation analysis was carried out by calculating by Pearson correlation coefficient to determine the relationship between the investigated indicators. $p<0.05$ was calculated as the criterion of statistical reliability of the obtained results.

RESEARCH RESULTS

Our study was conducted in the base of therapy and endocrinology 2 of the TMA multidisciplinary clinic. After consenting to participate in the study, all patients were asked to complete a sleep quality assessment questionnaire.

The glycated hemoglobin index of the examined patients ranged from 7,5 to 10%, which indicates an unsatisfactory level of carbohydrate metabolism.

Based on the duration of DM disease, patients were divided into 3 groups:

Group 1 (34 people, 28,3%) - patients with newly diagnosed DM lasting up to 5 years (men - 12, women - 26), the average duration of the disease is 3,0 + 1,6 years;

Group 2 (53 people, 44,2%) - patients with DM lasting from 5 to 10 years (men - 16, women - 33), the average duration of DM – 6,4+1,9 years;

Group 3 (33 people, 27.5%) - patients with DM for more than 10 years (men - 13, women - 20), the average duration of the disease is 9,1 + 4,3 years.

All the chosen patients suffered from a severe form of DM, at the same time, patients with severe complications of DM and severe concomitant diseases were not included in the study. Patients taking oral hypoglycemic drugs were included in the study. Patients receiving insulin therapy were not included in the study.

2-table

Stages of DPN in examined patients depending on subjective and objective examinations

Stage	1 group patients with DM + sleep disorders n-79	2 group patients with DM, no sleep disorder n-41
0 stage (DPN«-»)	-	-
1 stage, subclinical (DPN1)	45 (56,9%)	25 (60,9%)
2 stage, clinical (DPN2)	34 (43,1%)	16 (39,1%)
3 stage, severe (DPN3)	-	-

As can be seen from table 2, the subclinical form of DPN prevailed in the examined patients in group 1 and group 2 DM – 56,9 and 60,9%. The clinical form was diagnosed in 43,1 and 39,1% of patients. As mentioned above, patients with severe type 2 DM (diabetic foot, gangrene patients were not included in the examination).

As mentioned above, the study included patients complicated by the painful type of DPN. We divided the patients into 2 groups based on the presence and absence of sleep quality disorders. 79 (100%) patients in group 1 had sleep quality disorders, 41 (35,8%) patients in group 2 had no sleep quality disorders, and it should be noted that 85% of patients with sleep quality disorders was organized by women. In addition, 58 (73%) patients with sleep quality disorders also have AH. Symptoms of DPN include: burning sensation, sharp pain, especially in the evening, stabbing pain at rest, tingling sensation all over the body, often in the legs, painless contractions, cramps.

3-table.

Clinical indicators of patients based on randomization

Characteristics of examined patients	Control group n-20	1st group patients with DM + sleep disorders n-79	2nd group patients with DM, no sleep disorders n-41
Male	8 (40%)	19(24%)	14(34,2%)
Female	12(60%)	60(76%)	27 (65,8%)
Age	55,9±7,5	55,9±3,8	56,5±7,1
BMI, kg/m2	29,5±6,4	33,4 ±8,1	34,4 ±5,9
AH in anamnesis, (%)	5 (25%)	56 (70%)	16 (40%)
Duration of DM by anamnesis, years	-	8,5 (4,0;12,0)	7,9 (3,5; 11,0)
SAP, mm pb. col.	133,5±11,3	157,2±13,5	157,7±14,3
DAP, mm pb. col.	88,7±5,8	98,1±7,4	98,34±7,6
HR, beats/min	76,0±9,1	77,11±8,89	78,28±9,07
LVH, %	59,7%	83,7%	89,5%

Angina pectoris FC I-II	-	4 (9,5%)	8 (19,0%)

Data in Table 3 show that 83,7% of patients have 1 degree obesity and 89,5% have left ventricular hypertrophy (LVH). LVH, in turn, is considered the main predictor of death from cardiovascular causes.

Analyzing the results of the patients' carbohydrate metabolism, at the time of arrival, the carbohydrate metabolism indicators of all patients were evaluated as unsatisfactory. Carbohydrate metabolism was found to be elevated in both investigated groups compared to the control group, including fasting glycemia by 48% in group 1 and 43% in group 2, postprandial glycemia by 52% in group 1 and 54% in group 2, and HbA1s by 37% in group 1 and group 2 increased by 39%.

4-table.

Blood biochemical test results of patients with type 2 DM (M±m)

Tests	Control group n-20	1st group patients with DM + sleep disorders. n-79	2nd group patients with DM, no sleep disorders. n-41
Fasting glycemia, mmol/l	4,5±1,2	8,5±1,0*	8,7±1,7*
Postprandial glycemia, mmol/l	6,3±1,0	14,5±3,0*	13,9±1,0*
HbA1c, %	5,5±0,5	8,9±1,0*	8,8±1,3*
Total cholesterol, mmol/l	4,3±0,7	6,1±1,7*	5,8±1,4
Triglycerids, mmol/l	1,5±0,08	2,46±1,51*	2,51±1,82*
HDL, mmol/l	1,35±0,4	0,88±0,33*	0,91±0,37*
LDL, mmol/l	2,9±1,8	4,34±1,8*	4,02±1,30*

Note:*- reliability relative to the control group is available ($p<0,05$)

When the lipid profile indicators were examined in the patients, they were diagnosed with IIb phenotype dyslipidemia according to Fredrickson's classification of primary dyslipidemia. Table 4 shows the high level of TC, triglycerides and LDL, and the low level of HDL in patients. It is known that unsatisfactory glycemic control and dyslipidemia are risk factors for cardiovascular diseases in patients with type 2 DM [8,21].

5-table.

AH levels of patients with type 2 DM

stages of AH	Control group n-20		1st group patients with DM + sleep disorders. n-79		2nd group patients with DM, no sleep disorders. n-41	
	Quantity	%	Quantity	%	Quantity	%
Normal ABP	10	50	9	11,3	12	29,3
High normal	5	25	12	15,2	10	24,4

ABP						
AH 1 stage	4	20	42	53,2	14	34,1
AH 2 stage	1	5	16	20,3	5	12,2

Table 5 shows that patients with AH 1 and AH 2 levels predominated among the examined patients (54.9%). At the same time, 23.8% of patients with normal arterial blood pressure and 16.6% of patients with AH 3 level were also identified.

Clinical complaints of DPN in patients are known and include: pain, tingling, paresthesias, and burning sensation. In this study, the degree of manifestation of DPN was evaluated using the TSS (TotalSymptomsScore) scale. In DPN stages 2 and 3, 77,8% of patients had positive neuropathic symptoms.

6-table.

Specific signs of diabetic neuropathic symptoms, frequency of manifestation according to TSS

Complains	1st group patients with DM + sleep disorders. n-79	2nd group patients with DM, no sleep disorders. n-41
Pain, %	85,5	45,8
Rubbing, %	93,1	77,3
Paresthesias, %	16,9	14,3
Burning sensation, %	23,9	24,1

Among the complaints of the patients, the most common complaint was leg cramps - 93.1% in group 1, 87,3% in group 2, and pain was reported by 85.5 and 45.8% of patients, and the pain worsened in the evening. it gets stronger, burning sensation in the legs is present in 23,9 and 24,1% of patients, and paresthesia in the legs is present in 16,9 and 14,3% of patients (table 6).

At the next stage, the sleep quality of DM patients was studied. The PSQI questionnaire was used as a tool for studying the quality of sleep. The questionnaire consists of 19 items and helps to assess the quality of sleep based on 7 components: subjective quality of sleep, latency of sleep, length of sleep, subjective assessment of sleep sufficiency, sleep disorders, use of sleep-inducing drugs, daily activity disorders. When determined using the Pittsburgh questionnaire, the average sleep quality index of patients in group 1 was 10,89±0,77 points ($p<0.05$), which indicates that the examined patients have poor sleep quality. In patients without sleep disorders, this index was 4,92±0,77 points.

7-table.

Index of examined patients in the Pittsburgh questionnaire

Groups	1st group patients with DM + sleep disorders n-79	2nd group patients with DM, no sleep disorders n-41
Scores	10,89±0,77*	4,92±0,77

Note:*- reliability relative to the control group is available ($p<0,05$)

Complaints of patients with type 2 DM related to sleep disorders are presented in Table 8. The most frequently reported complaints of patients in group 1 was "feeling of fatigue after waking up from a night's sleep", this complaint was reported by 100% of patients, 79.7% of patients reported "difficulty going back to sleep after waking up", 78, 4% of patients suffer from "not getting enough sleep", 73,4% of patients suffer from "light sleep with night awakenings", and 70,8% of patients "cannot sleep for more than 30 minutes".

8-table.

Complaints of patients suffering from type 2 DM related to sleep disorders.

Complains	1st group patients with DM + sleep disorders. n-79		2nd group patients with DM, no sleep disorders. n-41	
	Quantity	%	Quantity	%
1. Feeling of fatigue after waking up from a night's sleep	79	100	21	45
2. Difficulty going back to sleep after waking up	63	79,7	15	36,6
3. Not getting enough sleep	62	78,4	6	14,6
4. Light sleep with night awakenings	58	73,4	12	29,2
5. Cannot sleep for more than 30 minutes	56	70,8	2	4,8
6. Superficial sleep, with many dreams	51	64,5	2	4,8
7. Night waking with headache	37	46,8	10	24,7
8. Nightmares	25	31,6	2	4,8
9. Daytime sleepiness	23	29,1	-	0
10. Daytime sleep	13	16,4	4	9,6
11. Night sweats	19	24,0	7	17,0
12. Not being able to sleep at night	9	11, 4	-	0

The most common complaint among patients in group 2 is "feeling of fatigue after waking up from a night's sleep", which also bothers 45% of patients in this group, "difficulty falling back to sleep after waking up" was reported by 36,6% of patients. "Surface sleep with night awakenings" was found in 29,2% of patients, "Night waking with headache" complaint was found in 24% of patients, and "night sweats" was found in 17% of patients. . Complaints of "insomnia" (78,4%) and "can't sleep for more than 30 minutes" (70.8%) that bothered the patients of group 1 a lot, the corresponding behavior of patients of group 2 was 14.6% and 4,8% of patients met.

Conclusions:

1. Among the patients of the 1st and 2nd groups with type 2 diabetes mellitus, the subclinical stage of DPN was detected in 56.9% and 60.9%, and the clinical stage - in 25.8% and 39.1% of patients, respectively. Thus, patients with type 2 diabetes often have a subclinical stage of DPN.

2. The main risk factor for the development of DPN is hyperglycemia and dyslipidemia. Meanwhile, HbA1c in both groups was higher to 37 and 39% respectively, compared to the control group. Blood levels of bad lipids such as LDL are also elevated by 43 and 45%, respectively.

3. 100% of patients with type 2 diabetes complicated by DPN have sleep quality disorders. It was confirmed by the Pittsburgh questionnaire that the average sleep index of patients in group 1 was 10.89±0.77 points ($r<0.05$), and in group 2 this index was 4.92±0.77 points. In turn, it was confirmed that the painful form of DPN has an effect on the quality of sleep of different patients with DM 2.

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