

RESULTS OF COMPLEX TREATMENT OF CLIMACTERIC SYNDROME ASSOCIATED WITH DIABETES MELLITUS TYPE 2**M. O. Pavlovska***Bogomolets National Medical University,
01601, Kyiv, T. Shevchenko boulevard, 13; e-mail: marynatrnk@gmail.com*

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia. The vast majority of diabetes cases are among the two largest etiopathogenetic categories: diabetes mellitus type 1 (DM-1) with absolute insulin deficiency and type 2 diabetes mellitus (DM-2), in which chronic hyperglycemia develops through a combination of insulin resistance and inadequate compensatory insulin secretion answers [3, 14]. With regard to the climacteric period, the greatest clinical significance has DM-2, which is 90-95% of all cases of diabetes. The incidence of diabetes is significantly increased in women 45-50 years of age and older. Note that women over 45 years of age have diabetes in 2 times more than men [6, 8].

Key words: *diabetes, chronic hyperglycemia, metabolic diseases, insulin resistance*

The age of menopause is one of the most critical periods in the life of a woman. Improper adaptation of the organism to the physiological exclusion of the ovarian function leads to the development of climacteric syndrome in 35-80% of women, which remains in 25-30% of patients over 5 years. Climacteric syndrome, which develops in conditions of deficiency of estrogens, is accompanied by a complex of pathological symptoms that arise depending on the phase and duration of this period [4]. Proved that sex hormones affect the functional activity of almost all organs and systems of the body, while the most significant clinical manifestations of estrogen deficiency, affecting the quality of life of women in the age of peri- and postmenopausal, include a high risk of atherosclerosis, arterial hypertension, ischemic disease heart (3 times), acute circulation disruption (7 times). These diseases occupy one of the leading places among the causes of morbidity and mortality in postmenopausal women [2].

At the same time, the DM is a classic model of micro- and macrovascular complications, and DM-2 is a disease of large vessels. Such a large lesion of the entire vascular bed does not occur in any other disease. Cardiovascular diseases and peripheral vascular diseases are the cause of higher morbidity and mortality in patients with DM-2 than the classical triad: nephropathy, neuropathy, retinopathy, although the risk of these diseases is also very high [9].

It has been shown that in women suffering from DM-2, menopause occurs earlier compared with healthy (46 and 48 years, respectively) [7]. The combination of climacteric syndrome and diabetes creates conditions for mutual burden. In this case, vasomotor manifestations of menopause in women with diabetes mellitus are weak and, as a rule, overlap with complaints of emotional and psychological nature [5]. Detection of diabetes mellitus in menopause and its adequate treatment can effectively compensate for the hormonal changes characteristic of the climacteric period. Complexities and problems (the majority of components in the substitution hormonal therapy adversely affect the hemostasis, carbohydrate and lipid metabolism, minimizing its positive effect) [10, 11], determine the search for non-drug treatment methods that expand the capabilities of doctors.

Physical factors in patients with diabetes are used to enhance the excretory function of the pancreas, with the aim of generalizing the effect on the body for correction of neurohumoral dysregulation of the endocrine system and resection of the astenoneurotic states (vegetative and sedative methods), as well as to combat complications and related diseases [1].

Thus, non-medicamentous methods can be used both for relieving symptoms of climacteric syndrome, and for the prevention and treatment of complications caused by DM-2.

Physical factors are widely used and proved their effectiveness both in complex use and in the form of monofactors [12, 13]. At the same time, there are only isolated scientific developments devoted to the correction of climacteric syndrome with a focus on the prevention of cardiovascular disorders, using physical factors. Also, there is virtually no research on the early prevention of cardiovascular disorders in climacteric women with DM-2 using physiotherapy methods.

Purpose: to compare the effectiveness of complex treatment methods for climacteric syndrome in patients with concomitant diabetes type 2, by analyzing biochemical parameters before and after complex therapy using physiotherapeutic procedures.

Materials and methods of research: 65 patients aged 45-55 years with a climacteric syndrome were examined at the background of diabetes mellitus type 2. Duration of DM 2 type (4.3 ± 1.5) years. In accordance with the tasks, to compare the effectiveness of treatment, analyzing the laboratory parameters, the patients were divided into groups. In the 1st group (29 patients) with diabetes type 2 against the background of climacteric syndrome, standard therapy received standard therapy in accordance with the National Protocols for the treatment of diabetes mellitus type 2 and COP. Group 2 included 36 patients with a similar illness, which applied physiotherapy (ultrasound therapy and contrast baths 2 times a week for two months) on the background of basic therapy.

Clinical examination included complaints of patients and anamnesis of the disease; objective data and gynecological examination. Also, the data of ambulatory and stationary maps, extracts from the history of the disease,

determination of biochemical and hormonal parameters of blood, results of special methods of examination were taken into account. Physiotherapeutic methods of treatment can be widely used both for the reduction of symptoms of the climacteric syndrome and for the treatment of vascular disorders. Scientific research and clinical practice have shown that treatment in the early stages of the development of climacteric syndrome positively affects the quality of life of women in subsequent years.

Method of conducting contrast baths: cold water temperature 24-22°C, hot 38-39°C, temperature contrast – 12-15°C. The ratio of patients' staying in hot and cold water during the procedure was 1 and 3 minutes. The number of procedures is 10-12.

After 40-60 minutes after the bath, a ultrasound therapy session with U.S.T. 1.01F apparatus with a frequency of 880 kHz in pulsed mode (10 msec) was paravertebral to the thoracic and cervical spine of the spine with an intensity of 0.2-0.4 W/cm² for 5 minutes on the field. The procedures were carried out in accordance with the lab method, the contact environment "Ultragel", the course was prescribed 10-12 procedures daily.

A comparative analysis of the biochemical parameters of blood in the examined patients with COP and associated DM 2 type, before and after a certain type of treatment, comparison of indicators with each other and with normal values was carried out.

Individual glycemic control was conducted with the help of the One Touch Basic Plus Express (Johnson and Johnson, USA), CHEKMATE (Caskade Medical inc., USA), Elite (Bayer, Germany) to monitor the stable compensation of diabetes mellitus.

The glycosylated hemoglobin (HbA1c) was determined by the ion exchange method using commercial test kits Glyco-chemoglobin HbA1-test No. 10657 or 10658, control serum No. 10259 Human in Germany, on the Beckman US DH-7 spectrophotometer.

Serum electrolytes (K⁺, C²⁺) were investigated using standard spectrophotometry. Concentration of cytosolic Ca²⁺ (in blood leukocytes) was investigated by luminescent microscopy. Cholesterol was determined on serum from KFK-2MP (Russia). The glucose content in the peripheral blood was examined by a standardized glucose oxidant method for the oxidation of ortho-toluidine.

The activity of total alkaline phosphatase (ZLF), expressed in OD / L, was determined in the biochemical analyzer Co-BAS-MIRAS (Switzerland).

As standard indicators in analyzing the results of laboratory studies, the standards of biochemical laboratories were used.

The statistical processing of the obtained results is carried out in the statistical package "STATISTICA 6.1" using parametric and non-parametric methods for evaluating the obtained results.

Results of the study and their discussion: in 80% of patients with diabetes type 2, the average degree of severity of the climacteric syndrome was found. With dominant metabolic and psycho-emotional manifestations,

and a lesser significance of neuro-vegetative disorders. In the second place after the above listed violations in women with diabetes mellitus type 2, complaints of the cardiovascular system appeared, which were detected in 60% of patients.

By comparing the data of the biochemical study of patients with concomitant diabetes before and after treatment, we observe that none of the laboratory parameters met the norm before the appointment of therapy. Correspondingly, carbohydrate metabolism, in particular the level of glucose in the blood and HbA1c, to a large extent exceeded the norm.

Also, the difference between the value of the atherogenic index and the activity of the total alkaline phosphatase in the blood was significant. A decrease in the concentration of ionized calcium was noted, while the level of cytosolic calcium was significantly increased.

Thus, analyzing the initial data, we see that in patients with perimenopause with concomitant endocrine pathology there were significant metabolic changes that affected the carbohydrate, lipid and mineral metabolism. These changes are obviously related to hormonal rearrangement, which is typical of the menopause, and with concomitant diabetes type 2.

A comparative analysis of the results of primary (before treatment) and repeated (after treatment) of biochemical studies, patients with climacteric syndrome and diabetes type 2 is presented in Table 1.

In both groups of patients with concomitant diabetes mellitus type 2, after the appropriate treatment, reduction in glycemia, glycosylated hemoglobin and atherogenic index was noted. An increase in ionized calcium was observed in both treatment groups, but the re-treatment showed positive dynamics only in the group receiving contrast baths and ultrasound therapy. Cytosolic calcium and potassium have been reduced in all treatment groups after each treatment, without, however, achieving normal numbers.

In these groups of patients, prior to the treatment, an increase in all three components of the climacteric syndrome was determined. When appointing a complex of treatment with the use of contrast baths and ultrasound, the severity of both neuro-vegetative, and metabolic and psycho-emotional manifestations decreased.

The severity of the manifestations of the climacteric syndrome varied as follows: in the first group, the percentage of patients with severe manifestations of the climacteric syndrome (9.5% before treatment and 15.5% after) increased slightly, and accordingly, the percentage of patients with mild COC (9,5% and 6,2%).

In the group receiving treatment for the use of contrast baths and ultrasound therapy, the dynamics was more pronounced (an increase in the number of women with mild progress from 7.5% and 32%). Also, the number of women with severe climacteric events decreased (18.3% before treatment and 3.9% after treatment).

Table 1. The results of primary (before treatment) and repeated (after treatment) of biochemical studies, patients with climacteric syndrome and diabetes type 2

Indicator, norm	Groups			
	1 (n=29)		2 (n=36)	
	1 course	2 course	1 course	2 course
Glycemia Mml/l 4,7±0,39	8,6±0,41 7,6±0,15*	8,0±0,71 7,5±0,31	7,9±0,30 7,4±0,21*	7,5±0,21 7,0±0,18
HbA1c% 5,2±0,17	8,1±0,10 7,6±0,12	8,2±0,31 7,3±0,40*	8,2±0,33 6,8±0,19*	7,1±0,11 6,3±0,15*
Atherogenous index 4,1±0,07	7,73±0,08 6,6±0,12*	7,5±0,12 6,5±0,19*	7,7±0,1 6,2±0,13*	7,3±0,12 5,3±0,1
Ca ²⁺ - ion Mml/l 1,21±0,03	1,14±0,05 1,16±0,03	1,12±0,06 1,19±0,02*	1,15±0,03 1,19±0,02*	1,16±0,04 1,22±0,03*
Ca ²⁺ -cyt Hml/l 42,9±3,28	56,8±1,05 53,1±1,9	56,4±1,14 50,4±1,98	58,6±3,1 46,5±2,4*	57,4±2,1 45,8±3,4
K ⁺ Mml/l 4,2±0,37	4,61±0,04 4,4±0,03*	4,6±0,05 4,4±0,08	4,3±0,04 5,1±0,06*	4,5±0,03 4,1±0,04
ZLF Od/L 75,8±5,12	108,5±3,8 81,2±2,8*	99,1±4,3 96,5±4,3	110,7±5,5 86,7±4,6*	112,5±4,8 80,4±3,3*

* - the difference is significant before and after treatment ($p < 0,05$)

In assessing the overall effectiveness of treatment, it was found that using only baseline therapy for climacteric syndrome and type 2 diabetes was -62%, while using a complex consisting of contrast baths and ultrasound - 78%. In the group of patients who used complex therapy with physiotherapeutic methods, the number of patients who completed the course of treatment without dynamics was significantly lower (15%) than treatment in the first group (31%). Also, the number of patients with negative treatment was lower (7%).

Conclusions

1. Climacteric period, which is a natural stage in the life of a woman, is characterized by a substantial restructuring of the functional systems of the organism, which often leads to the formation of various diseases. It is known that the prevalence of diabetes increases in older age groups, with this disease more prevalent among women, so many women are entering climacteric disease, which contributes to the development of osteoporosis and diseases of the cardiovascular system. Therefore, in women with concomitant type 2 diabetes, most laboratory characteristics are different from the norm.

2. Comparison of the effectiveness of therapeutic programs revealed that the inclusion of physiotherapeutic methods in integrated treatment reduces the metabolic and psycho-emotional processes in patients. Improve the state of carbohydrate metabolism and have a positive effect on lipid

metabolism. The effectiveness of contrast baths and ultrasound was 78%, while baseline treatment was 62%. Thus, the obtained results give a reasonable basis to recommend these complexes of physiotherapeutic procedures for the prevention of the development of cardiovascular complications and osteoporosis in women in the perimenopausal period with manifestation of climacteric syndrome and concomitant diabetes mellitus type 2.

Literature

1. Volotovskaya AV, Kozlovskaya LE. Fyzycheskiye faktory v lechenyy sakharneho dyabeta y eho oslozhnenyy. Fyzyoterapyya, bal'neolohyya y reabylytatsyya. 2013;(2):34-42.
2. Arteaga Urzúa E. Menopause and cardiovascular risk. Rev Med Chil. 2016 Nov;144(11):1375-1376.
3. Czupryniak L, redactor. Nowoczesna diabetologia w praktyce. Warszawa: Bonnier Business Polska; 2014. 59 s.
4. De Lorenzi DR. Evaluation of quality of life in climacterium. Rev Bras Ginecol Obstet. 2008 Mar;30(3):103-6.
5. Karvonen-Gutierrez CA, Park SK, Kim C. Diabetes and menopause. Curr Diab Rep. 2016 Apr;16(4):20.
6. Mauvais-Jarvis F. Epidemiology of gender differences in diabetes and obesity. Adv Exp Med Biol. 2017;1043:3-8.
7. Muka T, Asllanaj E, Avazverdi N, Jaspers L, Stringa N, Milic J, et al. Age at natural menopause and risk of type 2 diabetes: a prospective cohort study. Diabetologia. 2017 Oct;60(10):1951-1960.
8. Muñoz Enciso JM, Rosales Aujang E, Arias Ulloa R. Metabolic disorders in women during climacterium. Ginecol Obstet Mex. 2013 Apr;81(4):186-9.
9. Nanayakkara N, Ranasinha S, Gadowski A, Heritier S, Flack JR, Wischer N, et al. Age, age at diagnosis and diabetes duration are all associated with vascular complications in type 2 diabetes. J Diabetes Complications. 2018 Mar;32(3):279-290.
10. Niland P, Lyons AC. Uncertainty in medicine: meanings of menopause and hormone replacement therapy in medical textbooks. Soc Sci Med. 2011 Oct;73(8):1238-45.
11. Stuenkel CA. Menopause, hormone therapy and diabetes. Climacteric. 2017 Feb;20(1):11-21.
12. Taylor M. Complementary and alternative approaches to menopause. Endocrinol Metab Clin North Am. 2015 Sep;44(3):619-48. 1
13. Tonob D, Melby MK. Broadening our perspectives on complementary and alternative medicine for menopause: A narrative review. Maturitas. 2017 May;99:79-85.
14. Zheng Y, Ley SH, Hu FB. Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nat Rev Endocrinol. 2018 Feb;14(2):88-98.

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РЕЗУЛЬТАТИ КОМПЛЕКСНОГО ЛІКУВАННЯ КЛІМАКТЕРИЧНОГО СИНДРОМУ НА ТЛІ ЦУКРОВОГО ДІАБЕТУ ТИПУ 2

М. О. Павловська

*Національний медичний університет імені О.О. Богомольця
01601, м. Київ, бульвар Т. Шевченка, 13; e-mail: marynatrnnk@gmail.com*

*У жінок, які страждають на цукровий діабет 2 типу (ЦД-2), менопауза настає раніше, порівняно зі здоровими. Поєднання клімактеричного синдрому і ЦД-2 створює умови для їхнього взаємообтяження. **Мета роботи** – порівняти ефективність комплексних методів лікування клімактеричного синдрому в пацієнток із супутнім ЦД-2, шляхом аналізу біохімічних показників до та після комплексної терапії з використанням фізіотерапевтичних процедур. **Матеріали і методи дослідження.** Обстежено 65 пацієнток віком 45-55 років із клімактеричним синдромом на тлі ЦД-2. Тривалість ЦД 2 ($4,3 \pm 1,5$) роки. Клінічне обстеження включало скарги хворих та анамнез захворювання; об'єктивні дані та гінекологічне обстеження, дані амбулаторних та стаціонарних карт, виписки з історії хвороби, визначення біохімічних та гормональних показників крові, спеціальні методи обстеження. **Результати.** У групі, яка пройшла курс лікування, з використанням контрастних ванн та ультразвукової терапії динаміка була більш виражена (збільшення числа жінок із легким перебігом із 7,5% до 32%). Також зменшилася кількість жінок із важким перебігом клімаксу (18,3% до лікування і 3,9% після лікування). Ефективність контрастних ванн та ультразвуку складала 78%, тоді як базове лікування – 62%. Отримані результати дають обґрунтовану підставу рекомендувати дані комплекси фізіотерапевтичних процедур для профілактики ускладнень жінкам у перименопаузальному періоді з проявом клімактеричного синдрому та супутнім ЦД-2.*

***Ключові слова:** клімактеричний період, цукровий діабет 2 типу, лікування, контрастні ванни, ультразвукова терапія.*