

Kleban K. I. Specifics of mental disorders of patients with metabolic syndrome. *Journal of Education, Health and Sport*. 2017;7(9):650-664. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.1199656>  
<http://ojs.ukw.edu.pl/index.php/johs/article/view/5367>

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26.01.2017).  
1223 *Journal of Education, Health and Sport* eISSN 2391-8306 7

© The Authors 2017;  
This article is published with open access at Licensee Open Journal Systems of Kazimierz Wielki University in Bydgoszcz, Poland  
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.  
This is an open access article licensed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.  
The authors declare that there is no conflict of interests regarding the publication of this paper.  
Received: 15.08.2017. Revised: 20.09.2017. Accepted: 29.09.2017.

УДК: 616.89:[616.12-008.331.1+616-056.52+577.175.722:57.017

## **SPECIFICS OF MENTAL DISORDERS OF PATIENTS WITH METABOLIC SYNDROME**

**K. I. Kleban, MD, PhD**

**Bogomolets National Medical University, Kiev, Ukraine**

### **Abstract**

In the general-somatic network there is a steady increase in the number of patients with psychosomatic disorders. Problems of providing adequate psychiatric and psychotherapeutic assistance to this category of patients are related to the motivation of patients to participate in psychological measures and the readiness of the medical system to provide comprehensive care on the basis of the biopsychosocial approach. Mental factors are involved both in the occurrence and course of a metabolic syndrome in the form of a patient's lifestyle and behavior patterns of healthy functioning, and is a consequence of somatic pathology. Mental factors are involved both in the occurrence and course of a metabolic syndrome in the form of a patient's lifestyle and behavior patterns of healthy functioning, and is a consequence of somatic pathology. So mental disorders of metabolic syndrome are manifested in the form of psychosocial maladaptation, neurotic, affective, personality, and organic disorders. Desynchronosis which is a factor of the development of a metabolic syndrome and characterizes the complex chronobiological component of the regulation of psychophysiological functions in norm and under the influence of stress, deserves special attention.

Addressing the diagnosis of mental disorders associated with metabolic syndrome is precisely aimed at determining chronobiological disorders of psychosomatic integrated areas and is supposed to improve diagnostic and treatment process and to shorten the treatment of these disorders.

**Key words: nonpsychotic mental disorders, psychosomatic disorders, metabolic syndrome, desynchronosis, chronobiological processes.**

Today mental health has become one of the major problems of the healthcare industry. In Europe, the prevalence of mental illness in 2010 was 38.2%: anxiety disorders amounted to 14%, sleep disturbances - to 7%, depression - to 6.9%, somatoform disorders - to 6.3%, alcohol and drug dependence - to 4%, Attention deficit hyperactivity disorder - to 5%, dementia - to 1% [1].

The ECNP review emphasizes that brain diseases and mental disorders cause loss of ability in 26.6% of Europe's population [2]. The prevalence of mental and behavioral disorders continues to slowly increase - by 2.9% every 10 years. The steadily growing number of patients with mental disorders points to the need to develop new organizational approaches to the preservation, maintenance and restoration of mental and psychological health.

In recent decades the interest of both scholars and general practitioners to psychosomatic medicine has grown. The importance of combining mental, physical and social health of individual has been emphasized in the report of the World Health Organization (WHO) and has been strongly supported in many scientific studies. The principle of the unity of somatic and mental health, which is fundamental in modern medical science and practice, provides a comprehensive approach to clinical examination and treatment of the patient, therefore, is necessary for all medical professions.

Diagnosis and treatment of psychosomatic disorders, as well as the concept of "psychosomatic medicine", have undergone a complex evolutionary path. The frequency of psychosomatic disorders of the population is quite high and ranges from 15 to 52%, and in general medical practice - from 30 to 57% [2]. The register of psychosomatic response in recent years has considerably expanded due to the inclusion of diseases of the cardiovascular and endocrine systems, a large number of skin and urogenital diseases, migraines, etc [3, 4].

The problems of providing adequate psychiatric care in the primary medical network to psychosomatic patients with combined disease states (non-psychotic mental disorders and

somatic diseases) have been steadily increasing in recent years, because according to statistics, a large number of patients with chronic non-communicable diseases suffer from concomitant mental disorders, the most common of which is depression, anxiety, sleep disturbance. Significant growth of this kind of disorders significantly affects the level of social adaptation, quality of life of people and requires consideration of their role in the chronization of somatic diseases.

For patients with psychosomatic disorders distinctive are the following symptoms:

- a significant prevalence of masked, combined forms of mental disorders as opposed to classic clinically defined mental disorders;
- low level of motivation of psychosomatic patients for correction of the psychic sphere as a result of difficulties in understanding the genesis of their pathological condition;
- joining of the nosogenic-organic factor in the formation of psychic shifts.

"Classical" forms of mental disorders are quite standing out and noticeable, and there is no doubt about the need for their treatment. However, along with them, there is a wide range of psychosomatic disorders that greatly affect the quality of life of patients and reflect on the effectiveness of treatment, but they remain out of the attention of both doctors and patients themselves.

Registration of psychosomatic states of patients in the general-somatic network is complicated due to the following circumstances:

- the lack of a sufficient number of rates for mental health professionals (psychologists, psychiatrists, therapists);
- undefined interaction of general-somatic, medical-psychological and psychiatric services, overload of the former with "classical" psychiatric patients;
- a lack of knowledge and practical skills in diagnosing psychological maladaptation of physicians who can not timely recognize and direct the patient to a mental health professional;
- domination of the implementation of a medical model of care focused on the treatment of the disease, as opposed to the medical-psycho-social, which takes into account psychological and psychosocial aspects;
- social stigmatization of people with mental changes, as a result of which patients dissipate psycho-pathological symptoms or ignore them, are ashamed and afraid to seek psychological help;

- insufficient financing of the medical sector, which forces redistribution of costs into a more prioritized area of life saving, in contrast to improving its quality.

Consequently, despite the wide range of psychosomatic disorders, this category of patients does not receive the necessary psychological and psychotherapeutic assistance.

The psychosomatic approach to the mechanism of formation of a metabolic syndrome, an acknowledged factor of cardiovascular risk, indicates that it is a painful condition with anxiety, fear, hypothyroidism, hidden aggression and alexithymia. A special role in the formation of metabolic syndrome is given to increased hostility and hidden forms of aggression, loss of the feeling of existential security [5 – 8]. If this combined condition is observed for a year or more, then the more it restricts the possibilities of physical, social and professional functioning, and also causes more long-term treatment than only in the presence of a physical illness.

Metabolic syndrome is a complex of interconnected symptoms of metabolic, hormonal and clinical disorders in the body [9]. This syndrome is widespread throughout the world and has a tendency to increase. More than 20% of young people in economically developed countries suffer from manifestations of metabolic syndrome, and the proportion of patients over the age of 60 is more than 45% [10, 11]. A study conducted by the American Association for Diabetes suggests that this syndrome tends to steadily grow among adolescents and young people (from 4.2 to 6.4%) [12]. Metabolic syndrome is more common among men, among women its frequency increases in the menopausal period.

Metabolic syndrome is diagnosed according to WHO classification in case one of the following states is observed: diabetes mellitus, glucose intolerance, nasal glycemia or insulin resistance; and at least two of the following: arterial hypertension (arterial pressure 140/90 mmHg), dyslipidemia: blood triglycerides greater than 1,695 mmol/l; high density lipoprotein lower than 0.9 mmol/L among men and 1 mmol/L among women, abdominal obesity: waist circumference of more than 0.85 for women or more than 0.90 for men, microalbuminuria: albumin in urine 20 ug/min. or albumin: creatinine 30 mg/g [13 – 15]. Patients also suffer from decreased activity of the immune system and poorer resistance to infections, there is a risk of developing cancerous diseases, there is early aging of the body.

The biological basis of all manifestations of metabolic syndrome, according to current research, is primary insulin resistance, which is the main pathogenetic nucleus of diabetes mellitus, obesity, arterial hypertension, concomitant systemic hyperinsulinemia and dyslipidemia,

and the trigger mechanism is the increased activity of the sympathoadrenal system [16 – 21]. However, so far, not all possible causes and mechanisms of development of insulin resistance in abdominal obesity have not been fully understood, not all components of the metabolic syndrome can be clearly linked and explained by insulin resistance [22].

The attention of practitioners to this pathology is primarily due to the fact that the metabolic syndrome is a high risk factor for the development of arterial hypertension, coronary heart disease and other cardiovascular pathology, as well as type 2 diabetes and other diseases [23, 24]. Accordingly, the search for ways to correct this pathological state can potentially reduce this particular somatic threat.

As an independent complex of clinical manifestations, metabolic syndrome was first described in 1980 by M. Hanefeld, W. Leonhardt. In 1985, S. Eaton and M. Konnor put forward the hypothesis that the genes of a modern person, adapted to a long evolutionary process to the dietary behavior of ancestors, are incapable of providing health in a context of a dramatic change in lifestyle for the past 100 years. The basis of this phenomenon is also the increase of sensitivity to desynchronizing environmental factors under the influence of increasing the level of stress in the population [25].

Many physiological functions in human bodies are characterized by predicted cyclicality, or rhythms [26 – 28]. Physiological parameters of the organism are not constant, static values. They rhythmically change within the life of the same person for a certain time, forming a range of standards.

The rhythms of changes in the body's functions are determined by the intensity of the processes of self-regulation of functional systems, which, by their activities, ensure the stability of various indicators of the internal environment and adaptation.

Environmental factors that affect the internal rhythm of the body can lead to functional impairment. Under stress, there are significant changes in the chronobiological characteristics of many physiological functions. They, along with other parameters, can be an independent indicator of the functional reserves of the organism, the severity of the delayed action, the effectiveness of restorative processes and become the basis for drawing up a scientifically grounded forecast of the dynamics of the functional state of the organism for the immediate and long-term perspective [29].

In recent years, the experimental data and clinical studies have appeared that make it

possible to formulate the chronobiological hypothesis of the origin of the disease. Obtained at the molecular level information on the existence of newly discovered special time genes, primarily associated with the function of the leading rhythmic diagnostic apparatus of the brain, allows to re-examine previous views on the genetic basis of the disease. Therefore, the regularities of biological rhythms must be taken into account when prophylaxis, diagnosis, treatment of these diseases is taken [30, 31].

The risk factors for metabolic syndrome include obesity, arterial hypertension, cardiovascular disease, insulin resistance, hyperglycemia, obesity, chronic inflammatory diseases, oxidative stress, history of gestational diabetes, sedentary lifestyle, and others [19 – 22].

As noted in the literature, arterial hypertension and insulin resistance are the most important risk factors for the development of metabolic syndromes that are modifiable, along with obesity and dyslipidemia. Arterial hypertension by metabolic syndrome carries a universal effect on meaningful functions for people, especially cognitive function, motion function and reactivity (generalized neurohumorrhagic disorders). Among patients with hypertension there is a decrease in the indicators of physical and social functioning [19].

Many experts believe that the main reason for the development of metabolic syndrome is obesity. Excessive abdominal fat leads to an excess of free fatty acids in portal blood flow, increasing fat deposits in liver and muscle cells. This way liver and muscular insulin resistance, hyperinsulinemia, dyslipidemia, arterial hypertension and, eventually, diabetes mellitus and coronary artery disease are developing [32 – 34].

The low prevalence of metabolic syndrome among patients with chronic inflammatory diseases is low. The reason for the development of metabolic syndrome in conditions of systemic inflammation is the ability of inflammatory mediators to cause metabolic disorders [20].

The analysis of epidemiological studies shows the impact of chronic stress on metabolic syndrome and, above all, social stress, which leads to maladaptation. As a result of various stress factors that exceed the compensatory capacity of the organism, there is an accelerated depletion of adaptation reserves, an imbalance arises in the work of the basic regulatory mechanisms supporting homeostasis, which leads to disorders in physiological systems, metabolic and behavioral responses. To eliminate them, the body compensatorily mobilizes immunological and neurohumoral systems of preservation of homeostasis. In the case of elimination of risk factors, sources of stress, additional supply of nutrients, the body restores viability entirety. Chronic

activation of the systemic response to stress leads to the inclusion of a pathological cycle of increasing the level of glucose and cholesterol in the blood, the need for an increased amount of insulin, which subsequently manifests itself clinically metabolic syndrome [18].

In case of preserving the negative conditions that contribute to the occurrence of a metabolic syndrome, the compensatory adaptive reserves of the organism are completely exhausted, which in the future leads to the main clinical complications of the metabolic syndrome (obesity, hyperglycemia, insulin resistance, hyperinsulinemia, hypertension, dyslipidemia), as well as the enhancement of oxidative and inflammatory stress and endothelitis. In case of unbalanced nutrition and dysbiosis, functional disorders are replaced by persistent metabolic, hemodynamic and organ damage (prolonged activation of the sympathetic nervous and hormonal systems, autonomic imbalance; organic dysfunction of the endothelium, constant decline in the synthesis of susceptible factors and increased neurotransmitter formations, persistent hypertension, increase in blood serum free fatty acids, dyslipidemia with marked deterioration of the lipid profile, increased proliferation of smooth muscle cells of blood vessels and heart, which provokes the formation of atherosclerotic plaques, etc.). Ultimately, specific illnesses or their complex lead to disability and death.

Lifestyle disorders also play a significant role in the development of a metabolic syndrome. Reducing physical activity and high carbohydrate eating habits are the main reasons that the incidence of metabolic syndrome increases (44). The need to address in the first place the visual diagnosis of a metabolic syndrome, rather than a laboratory, is due to the fact that during the visual diagnosis, there are groups of patients in which a change in lifestyle may have a significant prophylactic effect. That is why early detection, treatment and prophylaxis of metabolic syndrome are among the main tasks of physicians and health organizers, taking into account the need to combine macro and microsocial approaches to its study.

Diseases within the metabolic syndrome (hypertonic disease, obesity, diabetes type 2 CHD, etc.) are usually considered in the context of psychosomatic relationships. The emergence of metabolic disorders among mature and most active in the social plan age negatively affects the psychological state of the contingent: reduced physical activity, blocked urgent needs and plans, increased suspicion and hostility, dominated by anxious assessment of prospects [5 – 8]. Therefore, the threat of chronic stress increases dramatically, which, in turn, contributes to the development of psychosomatic dependencies.

An important psychological risk factor for the development of metabolic syndrome is the state of loneliness. It has been established that men and women without a constant partner drink lots of alcohol, skip meals, work very hard and lack emotional stability [35].

In numerical studies, it is found that mental disorders in a metabolic syndrome can be manifested in the form of psychosocial maladaptation, neurotic, affective, personality, and organic disorders [36 – 38]. At the same time there is a feeling of fatigue and exhaustion; periodic outbreaks of famine; emotional frustration - irritability, attacks of anger, panic fear, distrust, cognitive problems (hypnosis, loss of attention). Increased interest in the disorder of cognitive functions by depression is due to significant changes in the general system of understanding of the etiology and pathogenesis of the disease in connection with the expansion of methodical possibilities of structural and functional study of the brain. The severity of mental disorders correlates with the number and severity of somatic diseases within the metabolic syndrome [36].

Anxiety-depressive and hypochondria states are the most frequent. Conditions of anxiety worsen the course of the underlying disease, exacerbate the pain, reduce the quality of life of patients. The presence of anxiety-depressive disorders complicates the course of metabolic syndrome and leads to early disability [36, 37].

Among the main serious and frequent complications of metabolic is the development of depression. Depression disorder occupies one of the leading places among the reasons for the decline in quality of life, violating the full-fledged livelihoods in the society [38, 39].

According to the literature, the risk of depression among patients with metabolic disorders is twice higher than that of somatic healthy people. According to other data, some symptoms of depression are manifested among almost half of patients with metabolic syndrome. With depression there is a much more severe course of the disease, which leads to a deterioration of the prognosis of the underlying disease. The presence of affective pathology in the clinic of metabolic syndrome increases the risk of the development of concomitant somatic diseases, primarily cardiovascular, worsens the prognosis and significantly affects the quality of life of patients. Moreover, the degree of severity of depressive symptoms among patients directly affects the treatment, compliance with their diet, their social functioning. Social functioning of patients with a metabolic syndrome with depression is of great interest to scientists and is the subject of extensive scientific research [40].

Depressive syndrome often develops in the form of depression, which tends to recursion



and chronic course. The dynamics of depressive states in a metabolic syndrome is determined by the laws of the course of the main endocrinological disease, as well as psycho-traumatic factors and specifics of the patient. By itself, the metabolic syndrome is a serious psycho-traumatic factor: the onset of a severe somatic disease triggers a complicated mechanism for understanding the feeling of illness, which is important for the behavior of the patient and for the course of the disease. The emergence of complications of metabolic syndrome, social disadaptation of patients, the need for continuous maintenance therapy, and compliance with dietary nutrition also have a negative impact on the mental health of patients, increasing the severity of depression, promoting stabilization of neurotic symptoms [39].

Anxiety affection by psychosomatic diseases, including metabolic syndrome, is much simplified, which is manifested by a clinically low intensity of "anxiety"; controlled by a sense of anxiety, anxiety of waiting; suppression of disturbing motives to action, statements, affective discharges through laughter or crying; maskedness of manifestations of anxiety due to asthenic irritability, anger outbreaks and the desire for affective discharging, mainly through anger [36, 37]. Anxiety, according to literature, is more often found among patients with arterial hypertension, while depression is more common among patients with coronary artery disease.

According to the Sixteen Personality Factors Scale, increased anxiety, insecurity, emotional sensitivity and psychological adaptation were associated with an increase in cardiovascular mortality. Moreover, among aggressive individuals with metabolic disorders, myocardial infarction develops almost twice as often: the combination of metabolic syndrome and high hostility increases the risk of heart attack by 4.21 times compared with the absence of both risk factors, 2.75 times compared with the presence of only hostility, in 2,2 times in comparison with presence of a metabolic syndrome [24].

According to modern clinical recommendations, for the prevention and treatment of metabolic syndrome complex application of adequate medical therapy, psychotherapy, low calorie diet, physical activity, active lifestyle, etc. is required [40 – 44]. In determining the goal of somatic therapy of patients with metabolic syndrome, the assessment of the risk of development of a specific somatic disease within the syndrome is crucial. Therapeutic and prophylactic measures should be directed at the whole set of factors that determine the overall risk of development and progression of clinical manifestations.

It is necessary to evaluate the possibilities of different treatments at different stages of the

formation of incomplete metabolic syndrome and complete metabolic syndrome. In the functional, initial, stage of the disease of incomplete metabolic syndrome, psychotherapy and psychopharmacotherapy perform the function of the main - pathogenetic, and often the only methods of treatment. Psychotherapeutic methods in this case play a largely symptomatic role. This means that they are aimed more at the direct functional "layers", dynamic symptoms and, to a lesser extent, to the pathogenetic mechanisms of metabolic syndrome development. The authors believe that the early psychotherapy not only increases the speed and quality of recovery, but also improves subjective satisfaction of patients with the quality of treatment and life [41, 42].

By the formation of an organic somatic defect (obesity, hypertension, diabetes type 2, coronary heart disease, atherosclerosis within the metabolic syndrome), complex therapy is needed that includes psychopharmacotherapy.

Currently, a review of the tactics of mental disorders with metabolic syndrome is taking into account the development of new knowledge about the pathogenesis of the disease, biorhythms of carbohydrate metabolism and their impact on the course of the disease. A comprehensive approach in the study and identification of medical and psychopathological features of patients with metabolic syndrome will enable more accurate decision regarding methods of treatment, both medical and psychotherapeutic.

The urgency of the development of this subject is determined not only by the considerable spread of metabolic syndrome, but also by the peculiarities of its occurrence, its impact on the transformation of the quality of life of patients as a phenomenon associated with changes in individual consciousness, value orientations and peculiarities of socialization.

The results of existing studies leave unresolved a number of issues concerning the diagnosis of certain non-psychotic mental disorders of patients with metabolic disorders, namely, the influence of interrelation of chronobiological and clinical-psychopathological features of such disorders which are insufficiently investigated. Solving the problem of diagnosis of mental disorders associated with metabolic syndrome, aiming at the determination of chronobiological disorders of a holistic psychosomatic sphere, should improve the quality of the medical diagnostic process and reduce the timing of treatment of these disorders, reduce the specific gravity of the complications of the disease among this category of patients.

## References

1. Voloshyn P. V. Stratehiya okhorony psykichnoho zdorov"ya naselennya Ukrayiny: suchasni mozhlyvosti ta pereshkody / P. V. Voloshyn, N. O. Maruta // Ukrayins'kyi visnyk psykhonevrolohiyi. – 2015. – T. 23, vyp. 1 (82) – S. 5 – 11.
2. The size and burden of mental disorders and other disorders of the brain in Europe 2010 / H. U. Wittchen, F. Jacobi, J. Rehm [et al.] // Eur. Neuropsychopharmacology. – 2010. – Vol. 21. – R. 655 – 679.
3. Sukyasyan S.H. Faktory, assotsyurovannyye s depressyey, v obshchey medytsynskoy praktyke / Manasyan N.H., Marharyan S.P. // Obozrenye psykhyatryi y medytsynskoy psykholohyy ym. Bekhtereva – 2007. – #4.
4. Korostiy V.I. Tryvozhni ta depresyvni rozlady u khvorykh molodoho viku z psykhosomatychnymy zakhvoryuvannyamy: klinichna struktura ta dyferentsiyovana terapiya / V.I. Korostiy // Tavrych. zhurn. psykhyatryi - 2011. – T.15, #2. - S.29.
5. Voronenko N.Yu. Sotsial'no-psykholohichni osoblyvosti zdorov"ya zhinok iz metabolichnym syndromom / N. Yu. Voronenko // Ukr. med. chasopys - 2013. - #. 3. - S.146-149.
6. Zhabenko O.Yu. Osoblyvosti psykichnykh ta psykhosomatychnykh rozladiv pry psykhoendokrynnomu ta metabolichnomu syndromakh / O. Yu. Zhabenko // Ukr. nevrol. zhurnal - 2012. - #1. - S.62-65.
7. Zhabenko O.Yu. Metabolichnyy syndrom iz psykhosomatychnoyi tochky zoru / O.Yu. Zhabenko // Med. psykholohyya - 2010. – T.5, #1. - S.99-101.
8. Kopchak O.O. Vplyv metabolichnoho syndromu ta yoho okremykh komponentiv na tyazhkist' depresyvnykh rozladiv i kohnityvnykh porushen' u khvorykh iz dystsyrkulyatornoyu entsefalopatiyeyu / O.O. Kopchak // Ukr. nevrol. zhurn. - 2012. - #4. - S.62-67.
9. Sokolova L.K. Metabolycheskyy syndrom: klynyka, krytery dyahnostyky, pryntsyry terapii / L.K. Sokolova // Mizhnarod. endokrynol. zhurn. - 2010. - #1. - S.55-60.
10. Rasprostranennost' metabolycheskoho syndroma v orhanyzovannoy populyatsyy / Y.M. Mytrofanov, V.H. Selyatytskaya, Yu.A. Nykolaev, Yu.V. Lutov // Klyn. medytsyna - 2012. – T.90, #11. - S.47-50.
11. Metabolichnyy syndrom // Therapia. Ukrayins'kyi medychnyy chasopys - 2012. - #11. - S.76-77

12. Dyahnostyka metabolycheskoho syndroma: terapevtycheskoe rukovodstvo // Reproduktyv. endokrynolohyya - 2012. – #6. - S.53-55.
13. Diahnostychni kryteriyi metabolychnoho syndromu: evolyutsiya pidkhodiv i vykorystannya v klinichniy praktytsi // Innovatsiyi v medytsyni - 2012. - #9/10. - S.41-46.
14. Ohanov R. Metabolycheskyy syndrom: put' ot nauchnoy kontseptsyy do klynycheskoho dyahnoza / R. Ohanov, M. Mamedov, Y. Koltunov // Vrach - 2007. - #3. - S.3-7.
15. Bodnar P.M., Kononenko L.O., Mykhal'chyshyn H.P., Kononenko V.O. Metabolychnyy syndrom (ohlyad literatury) // Zhurn. AMN Ukrayiny. – 2000. – # 6 (4). – S. 677–685.
16. Dmytryev A.N. Metabolycheskyy syndrom: markery yndyvudual'noy predraspolozhennosti, dyahnostyka doklynycheskoy stadyi, obosnovanye taktyky vedenyya patsyentov / A.N. Dmytryev // Mizhnar. endokrynol. zhurn. - 2011. - #2. - S.93-101.
17. Moyseev S.V. Sympatycheskaya nervnaya sistema y metabolycheskyy syndrom / S.V.Moyseev, V.V.Fomyn // Klynycheskaya farmakolohyya y terapiya. – 2004. – # 13. – S. 70-74.
18. Sarychev Ya.V. Etiopatohenez ta diahnostyka metabolychnoho syndromu / Ya.V. Sarychev // Aktual. probl. suchasn. med.: Visn. Ukr. med. stomat. akad. - 2013. – T.13, # 2. - S.272-275.
19. Kolyadych M.Y. Kardiovaskulyarnye y metabolycheskiye rasstroystva u bol'nykh sakharnym dyabetom s soputstvuyushchey depressyey / M.Y. Kolyadych, Y.Y. Shaposhnyk // Klyn. medytsyna - 2011. – T.89, #2. - S.35-40.
20. Rol' lipotsytokiniv u patohenezi metabolychnoho syndromu / L.V. Shchekaturova, O.S. Larin, M.L. Kyrylyuk ta in. // Klin. endokrynolohiya ta endokryna khirurgiya - 2013. – #1. - S.15-25.
21. Skrypnyk N.V. Rol' yodnoho defitsytu ta hipotyreozu v rozvytku metabolychnoho syndromu / N.V. Skrypnyk // Visn. nauk. doslidzhen' - 2012. – #3. - S.35-39.
22. Zuyeva N.O. Metabolychnyy syndrom abo syndrom insulinorezystentnosti: klinichni proyavy ta terapevtychni pidkhody (metod. rekomendatsiyi). – K., 2008. - 19s.
23. Kovalenko V.M. Metabolychnyy syndrom: mekhanizmy rozvytku, znachennya yak faktora sertsevo-sudynnoho ryzyku, pryntsyipy diahnostyky ta likuvannya / V.M. Kovalenko, T.V. Talayeva, A.S. Kozlyuk // Ukrayins'kyy kardiologichnyy zhurnal - 2013. - #5. - S.80-87.

24. Копчак О.О. Vnesok metabolichnogo sindromu v rozvytok sudynnykh kohnityvnykh porushen' ta proyaviv depresiyi u khvorykh iz khronichnoyu nedostatnistyu mozkovoho krovoobihu / O.O. Kopchak //Probl. starenyya y dolholetyya - 2011. – T.20, #1. - S.90-98.
25. Рапопорт С.У. Khronomedytyna, tsyrkadyannyye rytmy. Komu eto nuzhno? / S.Y. Rapoport // Klyn. medytyna - 2012. – T.90, #8. - S.73-75.
26. 3. Arushanyan Э.В. Sovremennyye predstavlenyya o proyskhozhdenny tsyrkadyannyykh kolebanyy deyatelnosty serdechno-sosudystoy systemy v norme y pry patolohyy / Э.В. Arushanyan // Klyn. medytyna - 2012. – T.90, #4. - S.11-17.
27. Полуэктон М.Н. Эндокринная система y narushenyua sna. V kn.: Pod red. Levyn Ya.Y., Polkuэктон М.Н. Somnolohyya y medytyna sna. M.: Medforum, 2013: 408–422.
28. Bukhtyyarova Y.P. Khronobyolohycheskiye aspekty sakharnoho dyabeta / Y.P. Bukhtyyarova, V.A. Ulanova // Ukr. zhurn. klinich. ta laborator. medytyny - 2010. – T.5, #4. - S.20-23.
29. Lem R.V. Korrektsyya narushenyu tsyrkadyannyykh rytmov u patsyentov s depressyey / R. V. Lem // Ros. psykhyatr. zhurnal - 2010. - #2. - S.67-73.
30. Elliott W.J. Synkhronizatsiya likuvannya z rytmom khvoroby. Skorochenny vyklad / W.J. Elliott // Medytyna svitu - 2003. – T.14, #2. - S.144-148.
31. Hryn' K.V. Nayavnist' khronobiolohichnykh porushen' ta yikh zalezhnist' vid hlybyny depresyvnoho epizodu u patsiyentiv z rekurentnyy depresyvnyy rozladamy / K.V. Hryn' // Ukr. visn. psykhonevrolohiyi - 2012. – T.20, Vyp.3(ch.2). – S.172.
32. Strueva N.V., Mel'nychenko H.A., Полуэктон М.Н., Savel'eva L.V. Vlyyanye rasstroystv sna ynsomnycheskoho y obstruktyvnoho kharaktera na dynamyku massy tela u bol'nykh ozhyrenyem // Materyaly II Vserossyyskoho konhressa s uchastyem stran SNH "Ynnovatsyonnyye tekhnolohyy v endokrynolohyy": Sb. tezysov. – Moskva. – 2014. – S. 249.
33. Bratus' V.V., Talayeva T.V., Shumakov V.A. Ozhyrinnya, insulinorezystentnist', metabolichnyy sindrom: fundamental'ni i klinichni aspekty. - K.: Chetverta khvylya, 2009. - 413 s.
34. Sokolova L.K. Problema ozhyrenyya y yzbytochnoy massy tela u patsyentov s sakharnym dyabetom 2-ho typu / L.K. Sokolova // Mystetstvo likuvannya - 2010. - #10. - S.36-38.

35. Strueva N.V., Poluǎktov M.H., Savel'eva L.V., Mel'nychenko H.A., Katsyya H.V., Honcharov N.P. Osobennosti pyshchevoho povedenyya, emotsyonal'noho sostoyannya y pokazateley metabolizma u bol'nykh ozhyrenyem s ynsomnycheskymy rasstroystvamy // Ozhyrenye y metabolizm. – 2014. – # 2. – S. 24–29.
36. Lazebnyk I.V. Tryvozni rozlady u patsiyentiv z metabolichnym syndromom X (kliniko-psykhopatolohichni, patopsykholohichni ta likuval'ni aspekty): avtoref. dys. ... kand. med. nauk: 14.01.16 / I.V. Lazebnyk; Ukr. NDI sots. i sud. psykhiiatriyi ta narkolohiyi MOZ Ukrayiny - K., 2012. - 18s.
37. Lazebnyk, I.V. Tryvoha pry metabolichnomu syndromi Kh/ I.V. Lazebnyk // Med. psykholohyya. - 2010. - Tom5, N1. - S. 102-104.
38. Bardenshteyn L.M. Depressyvnye rasstroystva u bol'nykh sakharnym dyabetom 2-ho typu / L.M. Bardenshteyn, A.M. Mkrtumyan, A.H. Krupkyn // Ros. med. zhurnal - 2012. – #6. - S.36-39. [1,9-12].
39. Remyzova E.A. Vzaymosvyaz' kachestva zhyzny y trevozhno-depressyvnykh proyavlenyy u patsiyentov s sakharnym dyabetom y puty optymizatsyy terapiyu / E.A. Remyzova, O.Yu. Shyryaev, Y.S. Makhortova // Nevrol. vestnyk. Zhurn. ym. V.M.Bekhtereva - 2011. - T.43, #4. - S.44-46.
40. Diahnostyka i likuvannya metabolichnoho syndromu, tsukrovoho diabetu, prediabetu i sertsevo-sudynnykh zakhvoryuvan'. Metodychni rekomendatsiyi Robochoyi hrupy z problem metabolichnoho syndromu, tsukrovoho diabetu, prediabetu ta sertsevo-sudynnykh zakhvoryuvan' Ukrayins'koyi asotsiatsiyi kardiolohiv i Ukrayins'koyi asotsiatsiyi endokrynolohiv / [O.I.Mitchenko, V.V.Korpachev, A.E.Bahriy ta in.]. – Kyiv, 2009. – 40 s.
41. Bahatorivneva korektsiya psykhosomatychnykh rozladiv v zahal'niy medychniy praktytsi (na prykladi metabolichnoho syndromu X) / O.S. Chaban [ta in.] // Medix. Anti-Aging. Antyaydzhyh. Antystarinnya - 2010. - #2. - S.92-99/
42. Hete Y.V. Nemedykamentoznaya terapiya psykhosomatycheskykh rasstroystv u bol'nykh arterial'noy hypertonyey s metabolicheskyim syndromom Kh / Y.V. Hete // Zhurn. prakt. likarya - 2006. - #2. - S.20-28.
43. Radchenko L. M. Hipotenzyvna terapiya khvorykh iz metabolichnym syndromom: rekomendatsiyi ta realiyi / L.M. Radchenko // Ratsyonal'naya farmakoterapiya. - 2012. - #4. - S.36-38.

44. Pryntsypy antyhypertenzyvnoy terapiy pry metabolycheskom syndrome / V.V. Serheeva [y dr.] // Klyn. medytsyna - 2013. – T.91, #6. - S.4-8.