DOI: 10.23888/PAVLOVJ2018262229-237

КЛИНИЧЕСКИЕ И ЛАБОРАТОРНЫЕ ОСОБЕННОСТИ СОЧЕТАННОГО ТЕЧЕНИЯ МЕТАБОЛИЧЕСКОГО И СУСТАВНОГО СИНДРОМОВ

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Цель. Выявить клинические и лабораторные особенности совместного течения метаболического и суставного синдромов. ***Материалы и методы.*** В исследовании участвовало 126 человек. Из них было сформировано 3 группы: в 1-ую вошло 46 пациентов с коморбидной патологией, во 2-ую – 44 пациента с метаболическим синдромом, в 3-ью – 36 человек с суставным синдромом. Оценивались следующие параметры: антропометрические данные (рост, масса тела, индекс массы тела, окружность талии), липидный спектр, гликированный гемоглобин, неспецифические маркеры воспаления, суточный профиль артериального давления. ***Результаты.*** В группе коморбидной патологии получены более высокие средние значения массы тела – 115,8 [60;140] кг, чем во 2-ой и 3-ей группах – 93,5 [72;130] и 71,5 [58;98] кг, соответственно; показатель скорости оседания эритроцитов – 18,3 [5;34] мм/ч – был достоверно выше, чем во 2-ой группе (11,5 [2;24] мм/ч), а медиана холестерина (6,18 [5,39;6,85] ммоль/л) выше, чем в 3-ей группе (4,82 [3,48;5,61] ммоль/л). В 1-ой и 2-ой группах зарегистрированы более высокие средние показатели систолического артериального давления по сравнению с 3-ей группой – 158,5 [120;190]; 154,6 [115;190] и 126,4 [96;168] мм рт ст, соответственно. ***Выводы.*** У пациентов с сочетанным течением метаболического и суставного синдромов выявлены более высокие значения массы тела и систолического артериального давления. По данным лабораторного обследования у больных с коморбидным состоянием наблюдаются более высокие показатели холестерина и скорости оседания эритроцитов, чем при изолированных патологиях.

Ключевые слова: *метаболический синдром, суставной синдром, коморбидность, ревматические заболевания.*

CLINICAL AND LABORATORY PECULIARITIES OF COMBINED CLINICAL COURSE OF METABOLIC AND ARTICULAR SYNDROMES

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Aim. To identify clinical and laboratory peculiarities of a combined clinical course of metabolic and articular syndromes. ***Materials and Methods.*** In the research 126 individuals participated. They were arranged into 3 groups: the 1st group included 46 patients with comorbid pathology, the 2nd group – 44 patients with metabolic syndrome, and the 3d group –

DOI: 10.23888/PAVLOVJ2018262229-237

36 patients with articular syndrome. The following parameters were evaluated: anthropometric data (height, body mass, body mass index, waist circumference), lipid spectrum, glycohemoglobin, nonspecific markers of inflammation, daily profile of arterial pressure. ***Results.*** In the group with comorbid pathology higher average values of body mass were recorded – 115.8 [60;140] kg in comparison with the 2nd and 3d groups – 93.5 [72;130] and 71.5 [58;98] kg, respectively; erythrocyte sedimentation rate – 18.3 [5;34] mm/h was reliably higher than in the 2nd group (11.5 [2;24] mm/h), and median cholesterol (6.18 [5,39;6,85] mmol/L) was higher than in the 3d group (4.82 [3,48;5,61] mmol/L). In the 1st and 2nd groups higher average values of systolic arterial pressure were recorded in comparison with the 3d group – 158,5 [120;190]; 154,6 [115;190] and 126,4 [96;168] mm Hg, respectively. ***Conclusions.*** In patients with combined metabolic and articular syndromes higher values of body mass and systolic arterial pressure were identified. Based on the laboratory findings, parameters of cholesterol and erythrocyte sedimentation rate were higher in patients with comorbid condition than in those with the isolated pathologies.

Keywords: *metabolic syndrome, articular syndrome, comorbidity, rheumatic diseases.*

Metabolic syndrome (MS) is characterized by derangement of all kinds of metabolism, increase in mass of visceral fat, hyperinsulinemia and insulin resistance, and elevation of the arterial pressure. This pathology affects about 20-35% of population of Russia [1]. Also common in Russian Federation are rheumatic diseases. According to the data of Health Ministry, 15 mln individuals with diseases of this group are recorded [2]. Their main manifestation is articular syndrome (AS) which is a complex of symptoms resulting from damage to the anatomical structures of joints [3,4]. Patients with metabolic disorders are more inclined to development of the articular pathology. In recent 10 years increased incidence of comorbidity of MS and AS has been noted [5-7]. A high incidence of a combination of these syndromes can be attributed to common risk factors and similar pathogenesis. Contributing factors to these conditions are low social-economic status, hypodynamia, excessive body mass, arterial hypertension, insulin resistance and hyperinsulinemia, and also hereditary predisposition and genetic anomalies [8]. Such processes as chronic inflammation, oxidative stress and metabolic disorders also lead to these pathologies [5].

Aim of work – to identify clinical and laboratory peculiarities of a combined clinical course of MS and AS.

Materials and Methods

In the work 126 individuals participated. They were arranged into 3 groups: the 1st group included 46 patients with comorbid pathology, the 2nd – 44 patients with MS, and the 3d group – 36 individuals with AS. The average age of participants was 45.2±8.08 years. Distribution of respondents in groups by rheumatic nosology is given in Table 1.

Table 1

Distribution of Respondents by Rheumatic Nosology

Rheumatic Nosology	1st group, n / %	3d group, n / %
Gonarthrosis	22/47.8	12/33.3
Gouty arthritis	10/21.7	7/19.4
Rheumatoid arthritis	9/19.5	10/27.9
Psoriatic arthritis	5/11.0	7/19.4

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Into the research individuals with MS were included on the basis of recommendations of Russian Society of Cardiologists (2013). Requirements to patients with AS were:

- existence of rheumatic disease with damage to knee joints – gonarthrosis (except the 4th stage according to Kellgren-Lawrence), psoriatic, rheumatoid and gouty arthritis;
- diagnosis of the disease stated by a rheumatologist not later than 3 months before the study;
- no administration of intraarticular injections within 1 month before the study, and cancellation of nonsteroid anti-inflammatory drugs 1 week before the study.

Criteria for exclusion were the following conditions: 4th stage gonarthrosis according to Kellgren-Lawrence, endocrinopathies including diabetes mellitus, chronic disease of kidney, detachment of retina, diabetic foot, ischemic heart disease, arrhythmias of different genesis, hematological and neoplastic diseases, pregnancy, lactation period, intake of hypolipidemic drugs. Besides, into the research were not included patients with viral and bacterial infections, congenital pathologies of the musculo-skeletal system and traumatic lesions of the knee joints, and with mental disorders.

Participation in the research was voluntary. All respondents signed Informed consent approved by Ethical Committee of RyazSMU of Health Ministry of Russia.

In the process of work anthropometric parameters were measured: height, weight, body mass index (BMI) and waist circumference. Laboratory parameters were evaluated reflecting the condition of lipid and carbohydrate metabolism – cholesterol (ChS), low density lipoproteins (LDL), high density lipoproteins (HDL), triglycerides (TG), glycohemoglobin (GH), and non-specific markers of inflammation – erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), seromucoid. Daily monitoring of arterial pressure was conducted.

The height was measured using vertical height meter, and weight – using floor scales. Waist circumference was measured with a centimeter tape in a vertical position. BMI was calculated from the formula: body mass (kg)/height $(cm)^2$. Laboratory analyses were carried out on a semiautomatic analyzer ClimaMC-15. Glycohemoglobin was determined using analyzer of Statfax 4500 company. Daily monitoring of arterial pressure was conducted on МД-01-Дон monitor. Mathematical processing of the results was carried out using programs MS Excel 2012 and Statistica, version 10.0.

Results and Discussion

The type and degree of obesity were identified in anthropometric examination of patients. The results are presented in Table 2.

Table 2

Anthropometric Data of Patients of Studied Groups (Me [Q25:Q75])

Parameter	Groups		
	1st (MS+AS), n=46	**2nd (MS), n=44**	**3d (AS), n=36**
Height, cm	174 [160;186]	172 [158;188]	172 [162;182]
Weight, kg	115.8 [60;140]	93.5 [72;130]	71.5 [58;98]
BMI, kg/m^2	32. 9 [24.5;40.5]	30.9 [20.9;44.6]	23.6 [21.2;33.0]
Waist circumference, cm	104.5 [92;120]	100 [84;132]	74.5 [68;98]

The average value of BMI in the 1st group corresponded to I degree of obesity according to WHO classification (1997). Six patients (13.0%) had excessive weight, 22 patients (47.8%) had I degree obesity, 13 patients (28.2%) – II degree obesity, 5 patients (11.0%) – III degree obesity.

In the 2nd group median BMI also corresponded to I degree of obesity. Excessive body mass was stated in 15 individuals

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(34.1%), I degree of obesity – in 18 individuals (40.9%), II degree – in 7 (15.9%), III degree – in 3 (9.1%). The average BMI in the 3d group corresponded to the normal weight. However, 5 individuals had excessive body mass (13.8%), and 4 – I degree obesity (11.1%), but nevertheless, these patients had no abdominal obesity and metabolic disorders that excluded MS.

Thus, anthropometry revealed significant differences in body mass: in the group of combined MS and AS higher values of BMI were noted than in comparison groups ($p \leq 0.05$), as well as a tendency to increase in the waist circumference.

It is known that the condition of fat and carbohydrate metabolism influences the course of MS and AS [1,9]. Data of examination of lipid spectrum and parameters of glycohemoglobin are given in Table 3.

Table 3

Analysis of Parameters of Lipid and Carbohydrate Metabolism in Patients of Studied Groups (Me [Q25:Q75])

Parameter	Reference values	Groups		
		1st (MS+AS), n=46	2nd (MS), n=44	3d (AS), n=36
Total ChS, mmol/L	3.30-5.50	6.18 [5.39;6.85]	6.13 [5.32;6.78]	4.82 [3.48;5.61]
LDL, mmol/L	< 3.0	3.2 [2.6;5.7]	3.2 [1.0;4.0]	2.4 [2.1;3.3]
HDL, mmol/L	0.9-1.9	1.1 [0.7;1.7]	1.2 [0.7;3.1]	1.4 [1.0;1.6]
TG, mmol/L	1.00-2.29	1.90 [1.40;4.30]	2.05 [1.20;3.10]	1.40 [0.68;2.60]
HbA1C, %	4.0-6.0	5.25 [3.4;7.3]	4.86 [3.2;7.2]	4.50 [3.8;6.3]

In evaluation of lipid profile the average values of cholesterol, LDL and triglycerides in all groups did not cross the reference limits. In the 1st and 2nd groups increase in the average values of total cholesterol and LDL was noted. In patients with comorbid pathology the average value of the total cholesterol was reliably higher than in individuals with AS ($p<0.05$). In all groups median HbA1C was within the reference range, but patients with the combined pathology showed a tendency to a higher value of this parameter.

According to literature data, metabolic disorders in MS and in rheumatic pathology are promoted by systemic chronic inflammation [10,11]. Such parameters as CRP, seromucoid and ESR reflect severity and activity of the inflammatory process. Results of study of these parameters are given in Table 4.

Table 4

Nonspecific Markers of Inflammation in Patients of Studied Group (Me [Q25:Q75])

Parameter	Reference Values	Groups		
		1st (MS+AS, n=46	2nd (MS), n=44	3d (AS), n=36
CRP, units	0-5.00	5.83 [0;14.00]	5.41 [0;9.10]	3.26 [2.26;8.70]
Seromucoid, units	up to 0.20	0.30 [0.14;0.54]	0.24 [0.12;0.48]	0.27 [0.11;0.62]
ESR, mm/h	2-15	18.3 [5;34]	11.5 [2;24]	16.1 [2;34]

Median ESR in the group of comorbid pathology was reliably higher than in the group with MS ($p<0.05$). The average value of CRP in the 1st group was higher than in comparison groups, however, no statistically significant difference was obtained.

Arterial hypertension is a common symptom in MS and rheumatic diseases. It is induced by hyperinsulinemia, dyslipidemia, chronic inflammatory process, endothelial dysfunction, hyper reactivity of the sympathetic nervous system and activation of hypo-

DOI: 10.23888/PAVLOVJ2018262229-237

thalamic-pituitary-adrenal axis [12,13]. In our work parameters of the average daily arterial pressure were evaluated (Table 5).

Table 5

Data of Daily Monitoring of Arterial Pressure in Patients of Studied Groups (Me [Q25:Q75])

Parameter	Groups		
	1st (MS+AS), n=46	2nd (MS), n=44	3d (AS), n=36
Systolic arterial pressure, mm Hg	158.5 [120;190]	154.6 [115;190]	124.6 [96;168]
Diastolic arterial pressure, mm Hg	95.5 [82;110]	90.1 [70;110]	80.7 [65;101]

In the 1st and 2nd groups higher parameters of systolic arterial pressure were recorded as compared to the 3d group ($p<0.05$) with a tendency to higher values of diastolic arterial pressure. The obtained results can be explained by a combination of several simultaneously existing mechanisms of development of hypertension in patients with comorbid pathology and MS.

Thus, based on the data of some clinical and laboratory examinations, the peculiarities of combined course of MS and AS were identified. Patients with the comorbid pathology had higher BMI parameters. There was also found a tendency to increase in the waist circumference which is an indirect evidence of a more pronounced abdominal obesity in this group. The obtained results agree with the data of other authors who described a significant increase in body mass in individuals with MS and AC, as, for example, in gout [14].

Analysis of lipid profile showed increase in the level of cholesterol and LDL in blood of patients with MS. Here, the extent of increase in cholesterol was significantly higher in comorbid pathology. The obtained data do not contradict the results of other studies. Derangement of lipid metabolism is typical of all patients with MS [15]. Dyslipidemia is also commonly recorded in individuals with rheumatic pathology [16,17]. In particular, the levels of cholesterol and LDL in patients with rheumatoid arthritis are noted to be increased before the onset of the disease [18].

Evaluation of nonspecific markers of inflammation in the group with comorbid pathology revealed a more evident increase in ESR and the level of CRP indicating a high activity of inflammatory process. Similar changes were obtained in the works of other authors who studied these parameters in individuals with rheumatoid arthritis, and with combination of osteoarthrosis, arterial hypertension and obesity [10,19].

Higher parameters of systolic arterial pressure were recorded in patients with MS and in its combination with AS. These results were anticipated since arterial hypertension is the main component of MS. For individuals with rheumatic pathology elevated blood pressure is a confounding factor that enhances immunoinflammatory and autoimmune response in an organism [13,20].

Conclusions

1. In patients with metabolic and articular syndromes higher parameters of body mass were identified.
2. Combination of the given syndromes is associated with a more pronounced hypercholesterolemia.
3. Comorbid pathology is characterized by accelerated erythrocyte sedimentation rate which indicates high activity of a chronic inflammatory process.
4. High level of systolic arterial pressure is more characteristic of metabolic syndrome and of its combination with articular pathology.

DOI: 10.23888/PAVLOVJ2018262229-237

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Дополнительная информация [Additional Info]

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Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, о которых необходимо сообщить в связи с публикацией данной статьи. [**Conflict of interests**. The authors declare no actual and potential conflict of interests which should be stated in connection with publication of the article.]

Участие авторов: Горбунова Д.Ю. – дизайн исследования, статистическая обработка, написание текста, Моргунова З.А. – сбор и обработка материала, Урясьев О.М. – концепция и дизайн исследования, редактирование. [**Participation of authors.** D.Yu. Gorbunova – design of the study, statistical processing, writing the text. Z.A. Morgunova – acquisition and processing of the material. O.M. Uryasyev – concept and design of the study, editing.]

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DOI: 10.23888/PAVLOVJ2018262229-237

Цитировать: Горбунова Д.Ю., Моргунова З.А., Урясьев О.М. Клинические и лабораторные особенности сочетанного течения метаболического и суставного синдромов // Российский медико-биологический вестник имени академика И.П. Павлова. 2018. Т. 26, №2. С. 229-237. doi: 10.23888/PAVLOVJ2018262229-237.

To cite this article: Gorbunova DYu, Morgunova ZA, Uryasyev OM. Clinical and laboratory peculiarities of combined clinical course of metabolic and articular syndromes. *I.P. Pavlov Medical Biological Herald.* 2018;26(2):229-37. doi: 10.23888/PAVLOVJ2018262229-237.

Поступила/Received: 20.12.2017
Принята в печать/Accepted: 31.05.2018