

Metabolic syndrome and lower urinary tract symptoms

Sergey V. Shkodkin^{1,2}, Nina Ivanovna Zhernakova^{1*}, Vadim N. Dmitriev¹, Ksenia A. Bocharova¹, Alexey V. Lubushkin¹, Alexandr A. Nevskiy¹

ABSTRACT

Aim: We study the relationship between metabolic syndrome (MS) and urinary disorders. This article shows that MS is a risk factor for cardiovascular disasters, insulin resistance, and androgen deficiency in developed and developing countries. **Methods:** Patients with MS had statistically significantly more symptomatic on the International Prostatic Symptom Score scale and a lower quality of life index. **Results:** According to the uroflowmetry, the maximum flow parameters did not differ in the observation groups; however, in the main group, the mean velocity was lower with an increase in the duration of urination. Patients with the MS presented more severe complaints of pain on the Leeds assessment of neuropathic symptoms and signs scale compared with the control group. **Conclusion:** The data obtained make it possible to associate MS with the risk of the development of the syndrome of chronic pelvic pain and urgency in men.

KEY WORDS: Androgen deficiency, Chronic pelvic pain syndrome, Dysuria, Lower urinary tract symptoms, Metabolic syndrome

INTRODUCTION

A complete or partial combination of such symptoms as abdominal obesity, insulin resistance or type 2 diabetes mellitus, atherogenic dyslipidemia, arterial hypertension, hemostatic system disorders, endothelial dysfunction, and chronic subclinical inflammation is described in the literature as metabolic syndrome (MS).^[1] Every year, the MS problem deserves more attention, as there is a significant increase in patients suffering from this syndrome, both in economically developed and developing countries.^[2] The prevalence in the middle age groups (30–50 years) in Europe is 19–29% and in the USA up to 39%.^[3,4] Unfortunately, this trend is also relevant for Russia.^[5] For example, participation in the international study “Determinants of cardiovascular diseases in Eastern Europe: A multicenter cohort study” of the Wellcome Trust Foundation (UK), allowed for the first time to obtain data on the prevalence of MS in Russia according to the criteria of NCEP ATP III. According to the data, 26% of Novosibirsk residents aged 45–69 years suffer from MS.^[6]

One of the reasons for the development of MS or its result but rather both is androgen deficiency. Deficiency of testosterone along with hypodynamia and nutritional factor contributes to the manifestation of MS. Consequently, as many authors have shown, correction of hypogonadism has a positive effect on the anthropometric and biochemical components of MS, as well as on the concentration of markers of inflammation.^[7] An equally complex problem is the so-called chronic pelvic pain syndrome (CPPS). According to the recommendations of the European Association of Urologists (EAU) 2015, CPPS and prostatic pain syndrome occupy 90% of the structure of inflammatory diseases of the prostate gland. Currently, this pathology is considered in a variety of pathogenetic theories, and the search for the prevalent remains relevant. In our work, we tried to reveal the regularity of the course of CPPS, lower urinary tract symptoms (LUTS), and erectile dysfunction (ED) from the presence of MS in patients.

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The Aim of the Study

The aim is to study the search for correlations of the MS with CPPS and miscarriage in men.

¹Federal State Autonomous Educational Institution of Higher Professional Education Belgorod National Research University, 308015, 85, Pobedy St., Belgorod, 308015, Russia, ²Faculty of Medical Management and Pediatrics, Belgorod Regional Hospital, St. Svyatitel Ioasaf, Nekrasova street, 8/9, Belgorod, 308007, Russia

*Corresponding author: Nina Ivanovna Zhernakova, Faculty of Medical Management and Pediatrics, Belgorod National Research University, 85, Pobedy St., Belgorod, 308015, Russia. E-mail: zhernakova@bsu.edu.ru

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MATERIALS AND METHODS

The interest of our study was a group of 16 men with MS at the age of 40–50 years on average 48.5 ± 2.8 years who turned to an endocrinologist for overweight and did not have an established diagnosis of diabetes. A comparable age group of 48.6 ± 2.4 years included 13 men without MS ($P < 0.05$, Figure 1). The groups noted significant differences in such anthropometric parameters as weight, waist circumference, and body mass index, which in the main group were 94.1 ± 7.7 kg, 108.3 ± 10.3 cm, and 30.6 ± 1.3 , respectively, which is greater than the control group: 77.9 ± 6.4 kg, 87.8 ± 4.8 cm, and 24.4 ± 0.5 ($P < 0.05$, Figure 1).

Additional criteria for inclusion in the study were the normal level of prostate-specific antigen and the absence of inflammatory changes in the ejaculate. All patients signed informed consent.

Exclusion Criteria

Patients' refusal to participate in the study, female sex, established diagnosis of "diabetes mellitus," the presence of leukocytes in the analysis of urine after prostate massage, the presence of pathogenic microflora in the secretion of the prostate, and patients under the supervision of a neurologist were excluded from the study.

Patients were questioned on ASM questionnaires, International Prostatic Symptom Score (IPSS), pain scale Leeds assessment of neuropathic symptoms and signs (LANSS), and MIEF-5. An objective (physical) examination was performed. Laboratory diagnostics included the determination of the following parameters: Testosterone total and free, sex hormone-binding globulin, luteinizing hormone, insulin, glucose, glycosylated hemoglobin, and lipid profile. All patients underwent uroflowmetry, ultrasound of the bladder with determination of residual urine volume, and prostate transrectal ultrasound, with measurement of blood flow.

The reliability of the differences was determined by the nonparametric Mann–Whitney criterion, and the differences were considered statistically significant for a probability $>95\%$.

RESULTS AND DISCUSSION

The analysis of subjective evaluation of ED expression in the observation groups on the basis of the valid ICEF-5 scale made it possible to adequately and quickly assess the extent of erectile disorders. In doing so, we obtained the expected results, according to which the patients in the main group had a significantly lower overall score - 7.8 ± 0.9 compared with men not having MS - 14.3 ± 1.0 points ($P < 0.05$,

Figure 2). The presence of hypogonadism in the main group corresponds to the literature data on the MS problem. In our study, the level of testosterone in the main observation group was 10.3 ± 0.9 nmol/L and was significantly lower than that in the control group 16.0 ± 1.3 nmol/L ($P < 0.05$, Figure 2). The results obtained by us agree with other studies [8] which also confirms the hypothesis that MS is an independent factor of hypogonadism and ED [9,10].

In the analysis of the IPSS questionnaire, it was found that patients of both observation groups had a violation of the study. However, the studied index in patients with MS before the urologist's visit had a gradation of severe disorders and there was significantly more control. However, the studied index in patients with MS before the urologist's visit had a gradation of severe disorders and there was significantly more than control.

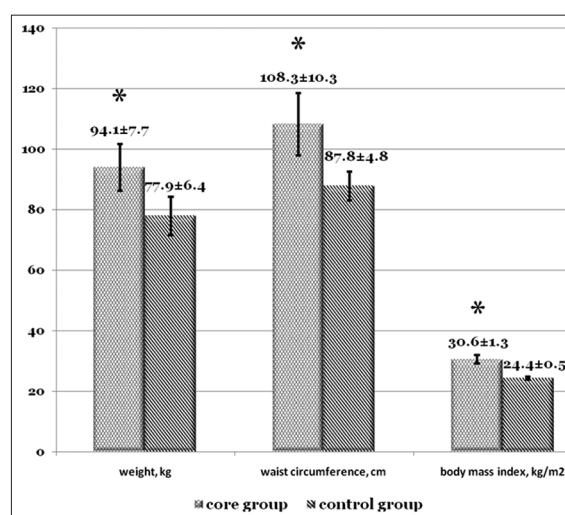


Figure 1: Morphometric data in observation groups. *There are statistically significant differences ($P < 0.05$)

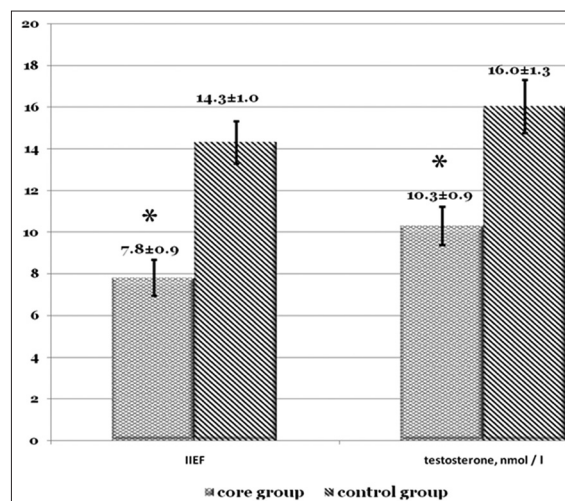


Figure 2: Index of erectile function on the scale of ICEF (5) in relation to the level of total testosterone. *There are statistically significant differences ($P < 0.05$)

It was 24.6 ± 2.7 points against 16.9 ± 2.6 points in the control group. ($P < 0.05$, Figure 3). Respondents of the main group mainly worried about irritative symptoms which led to a significant decrease in the quality of life (QoL) in this observation group. The average value of the QoL index in the main observation group was 4.5 ± 0.7 points, whereas in the control group, this figure did not exceed 3.2 ± 0.6 points ($P < 0.05$, Figure 3). The increase in the severity of LUTS could not be explained by the mechanical obstruction of the vesicourethral segment, so in the study groups, there were no differences in both the volume of the prostate and the volume of residual urine. The volume of the prostate gland in the main observation group was $28.4 \pm 1.2 \text{ cm}^3$ versus $24.1 \pm 0.9 \text{ cm}^3$ in the control group ($P > 0.05$, Figure 3). In patients of both observation groups, the volume of residual urine was not clinically significant. This indicator in the main group was $15.7 \pm 12.1 \text{ ml}$ in men, and in the control group, it was $7.2 \pm 5.8 \text{ ml}$ ($P > 0.05$, Figure 3).

Uroflowmetry also revealed no symptoms of bladder outlet obstruction, since the interpretation uroflourogram observation group registered significant differences in magnitude of the maximum urine flow ($P > 0.05$, Figure 4). However, in patients with MS, the mean space velocity of urination was lower due to an increase in the time of urination. The mean space velocity of urination in the main observation group was $14.8 \pm 2.7 \text{ ml/s}$, whereas in the control group, it was $18.2 \pm 3.5 \text{ ml/s}$ ($P < 0.05$, Figure 4). The increasing time of urination, obtained in our study in patients with MS, we associate with repeated reductions of the detrusor, especially at the end of the study, which can be attributed to the manifestation of its hyperactivity. The duration of urination in the MS group was 32.8 ± 4.2 versus the control group - 21.4 ± 3.5 seconds ($P < 0.05$, Figure 4).

The analysis of the pain scale of LANSS showed significant differences in the observation groups. Hence, in the main group prevalent pain symptoms were due to Orchidalia, Prostatodynia, Strangury. Based on the LANSS scale in the group with MS, the total score was 17.4 ± 0.9 , while in the control, it was 8.2 ± 0.4 points ($P < 0.05$, Figure 5). A detailed questioning of the patients of the main observation group was established. That chronic pain, as a manifestation of CPPS, was in fact one of the main factors in seeking medical help. In the literature, there is a rather large number of publications on the dependence of CPPS on the degree of development of atherosclerosis and ischemia. To study this hypothesis, we evaluated blood flow in the prostate in patients of both observation groups. The following results were obtained: Peak flow velocity in the main group Vmax reached $13.8 \pm 1.9 \text{ mm/s}$ and in the

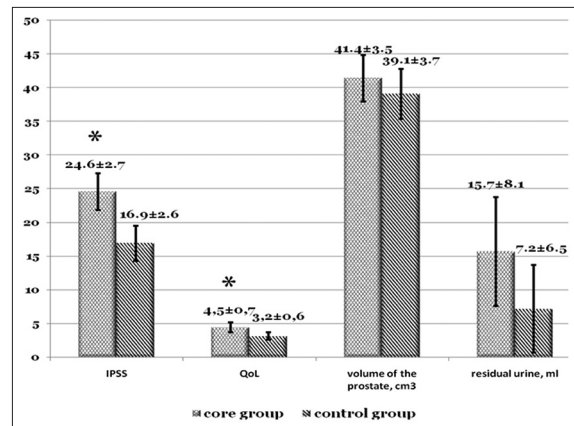


Figure 3: Correlations between the severity of lower urinary tract symptoms and ultrasound data. *There are statistically significant differences ($P < 0.05$)

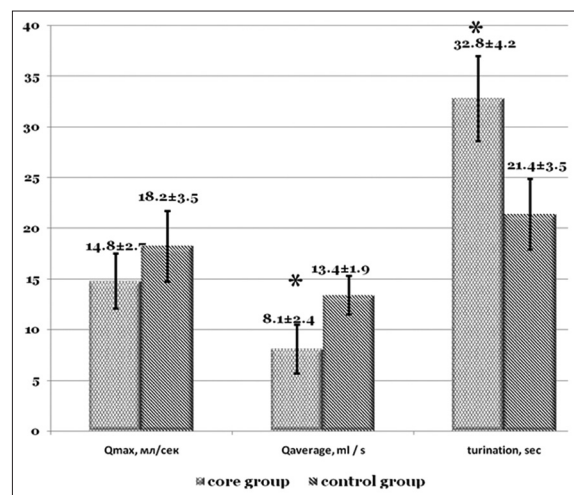


Figure 4: Urofluorogram indices in the groups in the observation groups. *There are statistically significant differences ($P < 0.05$)

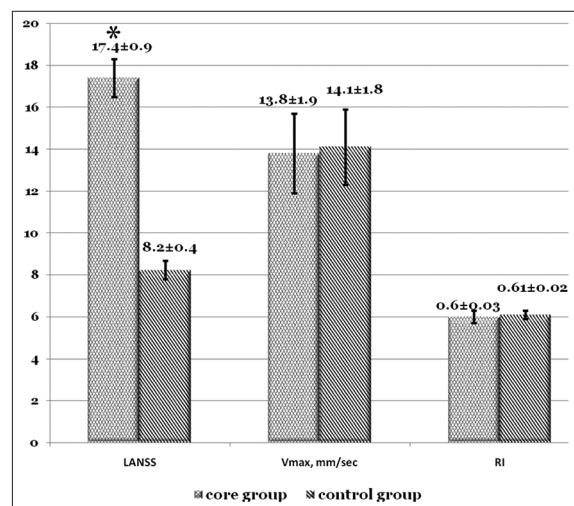


Figure 5: Severity of the chronic pelvic pain syndrome from blood flow in the prostate. *There are statistically significant differences ($P < 0.05$)

control Vmax - 14.1 ± 1.8 mm/s points ($P > 0.05$, Figure 5). The absence of significant differences was also demonstrated for the resistance index, which in the main group was 0.6 ± 0.03 and in the control was 0.61 ± 0.02 ($P > 0.05$, Figure 5).

Analyzing the data on the prevalence of the above pathology, one can judge about its significant increase in the population, which is regarded as a negative factor not only for a specific person but also for society as a whole. Currently available publications on earlier studies on MS do not allow obtaining a unified opinion about its influence on the course of many pathological processes. Along with the confirming results, there is also refuting. Focusing on our own results and literary data, we consider the evidence of hypogonadism and related ED in patients with MS. The data obtained on the predominance of irrational symptoms in patients with MS are quite interesting and, in our view, are related to the detrusor's hyperactivity. This may be the result of systemic proinflammatory cytokinemia associated with MS or ischemia detrouzov due to a deficiency of nitric oxide, as a consequence of hypogonadism.^[11]

CONCLUSIONS

Men who are on the border of young and middle age groups and who have morphometric signs of a MS are also at risk of having both hypogonadism and accompanying ED, that, however, is not the reason for seeking help from a urologist. Violations of urination in these patients consist in the predominance of irrational symptoms and do not correlate with the volume of the prostate and residual urine. In addition, in this group, we often recorded the presence of CPPS without significant changes in the blood flow in the prostate gland. The findings can be a manifestation of a systemic inflammatory reaction associated with MS.

Hence, MS acts as an independent factor of ED and hypogonadism, which leads to disturbances in the development of the brain tissue and the development

of CPPS. It is necessary to continue research in this direction because understanding details of the pathogenesis of these complications will allow for adequate pathogenic therapy.

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