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METABOLIC SYNDROME AND PSYCHOLOGICAL SYMPTOMS IN PATHOLOGICAL PREGNANCY

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SUMMARY

Base: *There are numerous studies that indicate the co-morbidity of a metabolic syndrome and mental disorders. Metabolic syndrome and mental disorders in pregnant women are rarely investigated, especially in pathological pregnancy.*

Goal: *To determine a relationship between predisposed factors in pregnancy and the occurrence of metabolic syndrome as well as to determine the occurrence of psychological symptoms and disorders in pregnant women.*

Subjects and methods: *The tested sample consisted of 162 pregnant women (80 with normal and 82 with pathological pregnancy). For the examination, 3 questionnaires were used: clinical, laboratory, ultrasound and radiological scanning. Metabolic syndrome was diagnosed according to WHO criteria, and psychological symptoms by using the SCL 90-R questionnaire.*

Results: *Metabolic syndrome was confirmed in 19 (23.2%) women with pathological pregnancy. These women had a greater prevalence of psychological symptoms ($p<0.001$).*

Conclusion: *Women with pathological pregnancy who are diagnosed with metabolic syndrome showed significantly more psychological symptoms.*

Key words: *metabolic syndrome – pregnancy - pathological pregnancy - risk factors*

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INTRODUCTION

Metabolic syndrome is a complex multi-systemic disorder, which is composed of multiple components including: abdominal obesity, lipid metabolism disorder, hypertension, and glucose metabolism disorder. The causes of the metabolic syndrome are numerous, including physical inactivity, dietary habits and disturbed function of the axis of the hypothalamic - pituitary - adrenal (HPA axis). The basic patho-physiological change is an increased activity of HPA axis, which leads to an increased amount of abdominal fat and the development of insulin resistance as well as the development of metabolic syndrome (Reaven 2002, Jakovljević 2004, Tsigos 2002). It is also characterized by proinflammatory and prothrombotic conditions. Both of these conditions result from a secretory activity of fat tissue and they can further increase the risk of an acute coronary incident. According to the World Health Organization (WHO), in Europe 7-36% of men and 5-22% of women aged 40-55 suffer from the metabolic syndrome. From individual components of the syndrome, the prevalence of an abdominal type of obesity is 39%, hypertriglyceridemia 30%, low HDL-cholesterol 37%, hypertension 34%, and hyperglycemia 30% (Ford 2002, Expert Panel, JAMA 2001).

Unique diagnostic criteria still do not exist. However, there are criteria according to the Adult Treatment Panel III (ATP III) and the criteria recommended by the WHO. According to ATP III criteria, diagnosis of metabolic syndrome can be determined if there are three or more out of five risk factors. For determining diagnosis by WHO diagnostic guidelines as opposed to the ATP III criteria, the presence of tissue resistance to insulin is required, which is manifested at least once in the following indicators: type II diabetes, elevated morning glucose or glucose tolerance disorder. There is also a difference in blood pressure values

and HDL levels. The criteria include general obesity (Body Mass Index - BMI), central obesity (the ratio between waist and hips circumference), and proteinuria. The criteria for pregnant women in this study did not include waist and hips circumference and other criteria from WHO table were taken. Metabolic syndrome and its components are associated with mental disorders, which manifest in a change of a sleeping pattern, an appetite, mood swings, and psychotic disorders. Smoking, alcohol consumption, environmental conditions, and economic status can influence the occurrence of metabolic syndrome especially in pregnancy, which is actually stressful for a body of a pregnant woman (Kallen 2001, Räikkönen 2002, Jesse 2006). Pathological pregnancy is stressful, and some features of the personality structure change.

The main goal of this study is to determine a relationship between the occurrence of metabolic syndrome and predisposed factors for the metabolic syndrome occurrence (body weight, blood pressure, diet, lipid levels in blood) in normal and patological pregnancy. It also aims to determine the relationships and appearance of mental disorders in pregnant women who were tested.

SUBJECTS AND METHODS

This research was conducted during 2007 and 2008 in the Department of Obstetrics and Gynecology at University Clinical Hospital Mostar. The study included 162 pregnant women.

The cross-sectional prospective study included 82 women in their 2nd and 3rd trimester of pregnancy, which were admitted to the Department of Pregnancy Pathology, Department of Obstetrics Gynecology of University Hospital Mostar and 80 women with normal pregnancy. They gave birth at the KB Mostar Maternity Hospital and these women were a control group. The criteria for participating in the study included: test and control groups of pregnant women were older than 18 and younger than 40 years regardless of parity (number of pregnancies). Pregnant women were mentally and physically healthy before the pregnancy. Exclusion criteria included: pregnant women who did not fill the questionnaires. These were adolescents younger than 18 years, women in their 1st trimester of pregnancy, pregnant women with a diagnostically confirmed mental illness, and women who had a mental disorder before pregnancy. The research also excluded mentally retarded pregnant women, women who were diagnosed with an early fetal anomaly, and pregnant women in puerperium.

Pregnant women and women who had just given birth filled a questionnaire during the pregnancy and within 48 hours after birth. The women filled the socio-demographic, obstetrics-gynecological, and standardized psychological questionnaire called SCL 90-R (Derogatis & Cleary 1977a, 1977b). For each woman, body mass index (BMI), triglycerides, HDL and LDL cholesterol levels were measured. Hips and waist circumference were not included. For a diagnosis of the metabolic syndrome, three or more criteria were taken according to WHO table. Elevated morning blood glucose level of 6.1 mol/L or more was a mandatory criterion. The data was stored in MS Excel 2003 database. For a statistical analysis, SPSS statistical program was used (SPSS for Windows 11.0, SPSS, Chicago, IL, USA) and for data processing, descriptive statistical methods were used. Distribution of the sample was tested by the Kolmogorov-Smirnov test. For assessing the differences among the tested groups in socio-demographic data, Chi-square test was used, while Student t-test was used for testing the differences in parametrical variables. Probability level of $p<0.05$ was considered as statistically important.

RESULTS

According to WHO criteria, out of 82 women with pathological pregnancy, 19 (23.2%) of them had a metabolic syndrome. These women showed a significant statistical difference in the appearance of mental disorders in all ten dimensions of the examined symptoms. Metabolic syndrome was not found in women with normal pregnancy.

Significantly more psychological symptoms in pregnant women diagnosed with metabolic syndrome ($p<0.001$).

Higher score of psychological symptoms and disorders was obtained in women who were moderately overweight and obese. The analysis of this data shows a statistically significant difference in diet during irregular pregnancy where the proportion of carbohydrates in the diet is increased. This significantly affects the occurrence of additional symptoms and diseases in pregnancy (obesity, gestosis, metabolic syndrome) (Chi-square test $p=0.001$).

Table 1. Prevalence of mental disorders in tested women with the metabolic syndrome and pathological pregnancy

SCL 90-R (X±SD)	Metabolic syndrome		t*	p
	No, N=63	Yes, N=19		
Somatization	0.80±0.60	1.70±0.83	4.84	<0.001
Obsessive-compulsive symptoms	0.68±0.55	1.53±0.61	6.45	<0.001
Interpersonal vulnerability	0.57±0.48	1.00±0.32	5.29	<0.001
Depression	0.79±0.48	1.43±0.51	5.60	<0.001
Anxiety	0.97±0.61	1.82±0.67	5.90	<0.001
Aggressiveness	0.44±0.42	0.90±0.36	4.67	<0.001
Phobias	0.29±0.38	0.64±0.36	3.85	<0.001
Paranoia	0.49±0.45	0.91±0.32	5.26	<0.001
Psychotic features	0.36±0.31	0.67±0.29	4.18	<0.001
Nonspecific symptoms	0.87±0.52	1.60±0.59	5.88	<0.001

*Student t-test

Table 2. Prevalence of mental disorders in relation to body weight of pregnant women and BMI (Body Mass Index)

SCL 90-R (X±SD)	Body weight			F*	p
	Normal	Moderate obesity	Obesity		
Somatization	0.77±0.59	0.93±0.73	1.02±0.74	1.37	0.257
Obsessive-compulsive symptoms	0.65±0.53	0.81±0.67	0.88±0.65	1.60	0.205
Interpersonal vulnerability	0.48±0.37	0.70±0.53	0.65±0.44	3.20	0.043[a]
Depression	0.79±0.51	0.87±0.53	0.96±0.54	1.21	0.300
Anxiety	0.91±0.62	1.11±0.70	1.21±0.67	2.01	0.138
Aggressiveness	0.39±0.36	0.53±0.48	0.56±0.44	0.30	0.739
Phobias	0.28±0.39	0.35±0.42	0.37±0.35	0.74	0.479
Paranoia	0.44±0.42	0.60±0.48	0.55±0.46	1.65	0.196
Psychotic features	0.36±0.32	0.42±0.33	0.42±0.33	0.50	0.605
Nonspecific symptoms	0.84±0.47	0.96±0.59	1.10±0.64	2.22	0.112

*One-way variance analysis; [a]Post hoc Sheffe test; p=0.046

Table 3. Results of laboratory tests of glucose, lipids and cholesterol in women with normal weight, moderate obesity and obesity

Variable (X±SD)	Body weight			F*	p
	Normal	Moderate obesity	Obesity		
GUK	4.34±0.73	4.49±0.98	4.95±1.18	4.70	0.010[a]
Triglycerides	2.37±0.85	2.74±1.20	2.77±1.13	1.87	0.158
Cholesterol	6.95±2.02	6.81±1.35	6.80±1.23	0.13	0.876
HDL	1.62±0.39	1.55±0.55	1.45±0.38	1.46	0.235
LDL	4.01±1.01	4.02±0.91	4.22±0.94	0.73	0.484

*One-way variance analysis; [a]Post hoc Sheffe test, p=0.017
[a]Significantly higher levels of GUK in pregnant women who were obese in relation to pregnant women with normal weight.

DISCUSSION

By analyzing the women with normal and pathological pregnancies, a significant statistical difference was noticed in psychological symptoms and disorders. This indicates that women who are hospitalized and who have pathological pregnancy have more mental disorders when compared to women with normal pregnancy. In this study, the women were given a questionnaire where for some items they selected options that were either moderately high or very high. The women with normal pregnancy provided 40.6% of 1, 2, 3, and 4 answers. Those with pathological pregnancy responded with 61%, which represents a significant statistical difference.

Table 4. The research results of dietary habits in all tested pregnant women

SCL 90-R (X±SD)	Dietary habits			F*	p
	<40% CH; N=17	40-60% CH; N=112	>60% CH; N=27		
Somatization	0.81±0.62	0.84±0.64	1.37±0.83	6.95	0.001[a]
Obsessive-compulsive symptoms	0.71±0.60	0.70±0.60	1.25±0.63	9.14	<0.001[b]
Interpersonal vulnerability	0.58±0.43	0.61±0.51	0.76±0.33	1.18	0.310
Depression	0.85±0.47	0.83±0.52	1.15±0.54	4.16	0.017[c]
Anxiety	0.94±0.57	1.02±0.67	1.50±0.65	6.14	0.003[d]
Aggressiveness	0.44±0.45	0.48±0.46	0.68±0.34	2.57	0.080
Phobias	0.36±0.40	0.30±0.41	0.48±0.30	2.24	0.110
Paranoia	0.48±0.39	0.51±0.48	0.76±0.39	3.44	0.035[e]
Psychotic features	0.39±0.29	0.38±0.33	0.50±0.33	1.34	0.264
Nonspecific symptoms	0.96±0.67	0.89±0.54	1.34±0.58	6.75	0.002[f]

*One-way variance analysis; [a]Post hoc Sheffe test; p=0.032; p=0.002; [b]Post hoc Sheffe test; p=<0.001; p=0.018; [c]Post hoc Sheffe test; p=0.019; [d]Post hoc Sheffe test; p=0.004; p=0.027; [e]Post hoc Sheffe test; p=0.043: [f]Post hoc Sheffe test; p=0.002

[a] Score significantly higher in women with s>60% compared to pregnant women with 40-60% and <40% (p=0.002, p=0.032);
[b] Score significantly higher in women with s>60% compared to pregnant women with s 40-60% and <40% (p<0.001, p=0.018);
[c] Score significantly higher in women with s>60% compared to pregnant women with s 40-60% (p=0.019);
[d] Score significantly higher in women with s>60% compared to pregnant women with s 40-60% and <40% (p=0.004, p=0.027);
[e] Score significantly higher in women with s>60% compared to pregnant women with s 40-60% (p=0.043);
[f] Score significantly higher in women with s>60% compared to pregnant women with s 40-60% (p=0.002).

Most frequently, they included somatization symptoms: headaches, feeling of dizziness and fainting, pain in various parts of a body, feeling of weakness and heaviness of hands and feet, etc., the symptoms of obsessive-compulsive dimensions: difficulty in memory and concentration, symptoms of depression: feeling of weakness and fatigue, mood decrease and excessive worry about anything, anxiety: anxiety and inner agitation, unanticipated fear without a reason, phobic symptoms of anxiety: the fear of going out, fear of open spaces, etc. The women showed fewer symptoms of hostility, paranoid behavior and psychosis. They more often showed difficulties, restlessness and sleep disturbance, excessive appetite (Derogatis 1977). The frequency of psychiatric disorders during pregnancy in a study conducted in India, which was published in 2005, was between 10-16% while in the postpartum period it was between 30-50%. The frequency of psychiatric disorders during pregnancy in a study conducted in Sweden was 6.4% (Börjesson at al. 2005).

According to the World Health Organization, criteria metabolic syndrome was found in 19 (23.2%) pregnant women who had statistically higher prevalence of psychological symptoms (p<0.001). Psychological disorders are more common in patients with the metabolic syndrome, which numerous studies conducted over many years including the newer ones indicate (Jakovljević 2007, McCarron 2007). They connect the warfare in our region, metabolic syndrom and mental disorders (Babić et al. 2007), psychotic reactions may appear (Maslov et al. 2008). Previous gestational diabetes and glucose intolerance increase the metabolic syndrome frequency in those women over the next five years (42%). (Survey conducted in the Department of Gynecology and Obstetrics Petrova, original work 2009).

The research revealed increased values of triglycerides and cholesterol in pregnant women. Increased values were found in moderately overweight and obese women with a higher BMI. Those women were taking more than 60% of carbohydrate in their diet, and showed a significantly higher score for psychiatric disorders in pregnancy. In the tested sample of women with pathological pregnancies, 19 of them (23.1%) corresponded to criteria for the diagnosis of metabolic syndrome. Obesity, diabetes and hypertension were significantly more frequent in pathological pregnancy. Women with pathological pregnancy had a statistically higher blood pressure (systolic 132.68 mmHg, 84.94 mmHg diastolic) compared to the group of women with normal pregnancy (118.13 mmHg systolic, diastolic 75.31 mmHg). The most common symptoms include: somatization, obsessive-compulsive symptoms, depression, anxiety and non-specific symptoms.

CONCLUSION

Pathological course of pregnancy significantly increases the prevalence and severity of psychological symptoms, which we confirmed by researching all ten dimensions of symptoms. Diet that has a higher proportion of carbohydrates leads to an increase in triglycerides and cholesterol, weight, blood glucose and the occurrence of metabolic syndrome in pregnancy. All these changes reinforce psychological symptoms, which can lead to various psychiatric disorders in pregnancy, especially if it is pathological pregnancy.

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