

CLINICAL STUDY

Metabolic syndrome and the risk of preeclampsia

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Abstract: *Objective:* The purpose of this study was to determine if the evaluation of the metabolic score is a suitable approach to assess the risk of preeclampsia.

Results: The overall number of deliveries in the study period was 2263, preeclampsia occurs in 182 cases. The evaluated metabolic score in these patients was following: 0 in 34 cases, 1 in 121 cases, 2 in 19 cases and 3 in 8 cases. The presence of metabolic syndrome (3 risk factors) was found only in 4.4 % of cases of preeclampsia, but at least one risk factor for the metabolic syndrome occurred in 81.3 % cases of preeclampsia.

Conclusions: The assessment of risk of preeclampsia is of interest due to higher perinatal mortality and morbidity in this group of patients. An association between preeclampsia and metabolic syndrome seems to be clear. In this situation, the use of metabolic score in assessing the risk of preeclampsia can help in early diagnosis and treatment of preeclampsia. Modification of metabolic score may be an appropriate method how to distinguish the risk of preeclampsia (Tab. 1, Ref. 17). Full Text (Free, PDF) www.bmj.sk.

Key words: metabolic syndrome, preeclampsia, cardiovascular diseases, hypertension.

Metabolic syndrome (MS) is the presence of risk factors causing cardiovascular disease (CVD). MS is not a disease per se, but it is the consequence of the current lifestyle.

The National Cholesterol Education Program – Adult Treatment Panel III defines MS as the presence of three or more of the five risk factors: abdominal obesity, blood pressure, triglyceride, high-density lipoprotein cholesterol, and fasting glucose levels.

Preeclampsia (PE) is a pregnancy-associated multiorgan disorder, caused by an altered trophoblastic invasion and endothelial cell dysfunction. Clinical signs are hypertension, proteinuria and edema. PE occurs in 5 to 10 % of pregnancies and is the main cause of perinatal mortality and morbidity.

Many of the risk factors related to MS are the risk factors in the development of preeclampsia (PE). At present, the research is focused on the association between MA, PE and CVD. Mazar et al (2007) proposed to establish a metabolic score to assess the risk of preeclampsia (1).

The objective of this study was to determine if the evaluation of the metabolic score is a suitable approach to assess the risk of PE.

Material and methods

In our retrospective study, we evaluated the metabolic score in all 182 patients with PE, who delivered at our department during the period 1 January 2007 to 31 December 2007. There were no excluding criteria. PE was defined according to the guidelines of the International Society for the Study of Hypertension in Pregnancy. PE was diagnosed when a previously normotensive woman had two repeated (4 hours apart) diastolic blood pressure measurements of 90 mmHg after the 20th week of gestation, together with proteinuria of more than 300 mg in a 24-hours urine specimen or at least two protein dipstick in two repeated measurements (4 hours apart).

Metabolic score was established by allocating one point for each risk factor as proposed by Mazar et al (2007). Coincident factors for MS and PE are considered obesity, hypertension and diabetes mellitus (1).

The data examined for this project were obtained in a study, which was approved by the Independent Ethics Committee of the University Teaching Hospital in Bratislava.

Results

The overall number of deliveries in the study period was 2263, vaginal delivery in 1544 cases and caesarean section in 719 cases. PE occurred in 182 patients. In the group of PE, the range of the maternal age was 17–38 (median 24.5), the range of parity 1–3 (median 1.4) and the range of the gestational age at the time of delivery was 29–41 (median 36.1).

The evaluated metabolic score was following: metabolic score

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Tab. 1. Metabolic score in preeclampsia.

Score	Number	%
0	34	18.7
1	121	66.5
2	19	10.4
3	8	4.4
————→ 1+2+3 = 81.3 %		
Total	182	100.0

0 in 34 cases of PE, 1 in 121 cases, 2 in 19 cases and metabolic score 3 in 8 cases of PE (Tab. 1). Metabolic score 0 means that no obesity, no hypertension and no diabetes mellitus occurred in patient with PE. Metabolic score 1 means that only obesity, or hypertension, or diabetes mellitus occurred in patient with PE. Metabolic score 2 means that two of these three symptoms occurred in patients with PE and metabolic score 3 means that all the three symptoms occurred in patient with PE.

There was no MS in deliveries without PE. In this group metabolic score 1 or 2 was detected in 19 cases (0.9 %).

Discussion

Although the etiology of PE remains obscure, abnormal placentation and endothelial dysfunction play a key role in this process. A shallow implantation with an impaired remodeling of spiral arteries leads to local ischemia. Endothelial dysfunction leads to hypoxia or an exaggerated inflammatory response with oxidative stress and endothelial damage.

Vasoconstriction with hypertension, insulin resistance, atherosclerotic and glomerular changes is a consequence of this process.

Some of the diagnostic tools are available. Markers of altered immunoregulation are toll-like receptor 4, fms-like tyrosine kinase-1, endoglin, macrophage colony-stimulating factor and T-cell receptor/CD 3-zeta (2–5). Markers of inflammatory response are human leukocyte antigen – G, calprotectin, nuclear factor kappa B, early growth response factor-1, adiponectin and leptin (6–10). Markers of oxidative stress are N-acetyl-transferase, malondialdehyde and 8-epiprostaglandin-F2 α (11). Genetic markers are HLA-D polymorphisms and cytokine genes polymorphisms (12). Markers of endothelial activation are endothelin-1 (13) and nitric oxide (14).

Detection of PE risk factors is very important due to the experimental character of many of these tools. Main risk factors are nulliparity, advanced maternal age, multifetal gestation, pregnancy weight gain, chronic hypertension, renal disease, previous PE, and interpregnancy change of partner.

Presence of risk MS factors in PE was confirmed by many studies. There exists a consistent positive association between an elevated maternal triglycerides and the risk of preeclampsia (15). Increases in the pre-pregnancy BMI from normal weight to overweight or obesity between pregnancies are associated with an increased risk of preeclampsia (16).

However, the scale of maternal and fetal problems during pregnancy and delivery are more complicated (17).

Our results showed the presence of MS in 4.4 % of PE only, but at least one MS risk factor occurred in 81.3 % of PE cases.

Conclusions

PE, similarly to MS, may lead to CVD. The association between MS a PE was clearly shown by many authors. On the other hand, PE is the cause of maternal and perinatal mortality and morbidity in many cases. In this situation, the assessment of PE risk is of interest. It seems that modification of the metabolic score may be an appropriate method how to distinguish this risk.

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