wjpmr, 2020,6(8), 373-376

SJIF Impact Factor: 5.922

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

A STUDY ON INFLAMMATORY MARKERS AND THE METABOLIC SYNDROME

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DOI: https://doi.org/10.17605/OSF.IO/VKRFA

Article Received on 21/06/2020 **Article Revised on 11/07/2020** **Article Accepted on 01/08/2020**

ABSTRACT

Background and objective: The metabolic syndrome has been conceptualized as a clustering of metabolic risk factors. Therefore, the main objective of the study is to analyse the relationship between inflammatory markers and the metabolic syndrome. **Material and methods:** This descriptive study was conducted in Post Graduate Medical Institute (PGMI), Lahore during October 2018 to March 2019. This study was done with the permission of ethical committee of hospital. The data was collected from 250 patients of both genders. The study groups were divided into three main parts. **Results:** The data was collected from 250 patients from which 150 females and 100 males. In the second group C-reactive protein is higher than in the first group with statistical significance (p = 0.02). Leukocytes have a less important value in establishing proinflammatory and cardiovascular risk contribution in patients with metabolic syndrome compared with C-reactive protein. **Conclusion:** It is concluded that obesity is the main factor of metabolic syndrome. Patients diagnosed with metabolic syndrome present an activated inflammatory status. Inflammatory syndrome is expressed according to the number of metabolic syndrome components.

KEYWORDS: Inflammation, Metabolic, Syndrome, Factors, Biomarkers.

INTRODUCTION

The metabolic syndrome has been conceptualized as a clustering of metabolic risk factors, including insulin resistance, dyslipidemia, central adiposity, and elevated blood pressure (BP) that increase risk for cardiovascular disease (CVD) and type 2 diabetes. These risk factors covary in epidemiological investigations and, when combined, predict incident disease, disease course, and mortality, with the aggregate syndrome accounting for cardiovascular risk beyond that associated with the component risk factors.[1]

The clinical definition of metabolic syndrome has undergone several iterations. The current guidelines promulgated by the American Heart Association and the National Heart, Lung, and Blood Institute largely overlap with those recommended by the International Diabetes Federation and require evidence of three of the following five criteria: elevated fasting glucose, elevated BP, large waist circumference,[2] elevated triglycerides and reduced high-density lipoprotein (HDL) cholesterol. Recently, it has also been proposed that markers of systemic inflammation be included in the definition of the syndrome.[3] In this regard, elevated peripheral levels of proinflammatory mediators, such as C reactive protein (CRP) and interleukin (IL)-6, correlate with individual components of the metabolic syndrome and confer cardiovascular and metabolic risk beyond that associated with the clinically defined syndrome.[4] Furthermore, mounting evidence suggests that inflammation plays a causal role in the development of both obesity and insulin resistance and may provide a common link between established components of the syndrome.[5]

The Metabolic Syndrome (MS) is associated with a systemic inflammatory response that plays an important pathogenetic role in atherothrombotic disease. Highly sensitive Creactive protein (hsCRP) and fibrinogen are acute phase reactants and indicate underlying adipokine with pro-thrombotic effects that is also increased in obesity, including children and adolescents when compared with a control group.[6] Some studies have reported an association between PAI-1 and the prevalence of MetS, including adolescents.[7] Increasing evidence suggests that chronic, lowgrade inflammation may be a common symptom involving the pathogenesis of MetS and cardiovascular disease. The contribution of the MetS to atherosclerosis may be related to its chronic inflammatory and thrombotic status.[8] A proinflammatory state, as indicated by increased circulating TNF-α and high-sensitivity C-reactive protein levels, and a prothrombotic state, evidenced by increased PAI-1 levels, are often observed in MetS patients. Other studies demonstrated that high-sensitivity C-reactive protein is an independent predictor for myocardial infarction, stroke, peripheral artery disease and sudden

cardiac death. In addition, an elevated PAI-1 level was a predictor of the occurrence of myocardial infarction.[9]

Therefore, the main objective of the study is to analyse the relationship between inflammatory markers and the metabolic syndrome.

MATERIAL AND METHODS

This descriptive study was conducted in Post Graduate Medical Institute (PGMI), Lahore during October 2018 to March 2019. This study was done with the permission of ethical committee of hospital. The data was collected from 250 patients of both genders. The study groups were divided into three main parts.

1. Abdominal obesity+arterial hypertension + hyperglycemia
2. Abdominal obesity +arterial hypertension +hyperglycemia + decreased high density lipoprotein + increased triglycerides
3. Control grouop

Biochemical Analysis

The blood was drawn from all patients for further analysis of inflammatory markers. Blood was centrifuged at 4000 rpm for 10 minutes and serum was separated. Blood samples were collected into EDTA tubes. Subsequently, indomethacin and butylatedhydroxy toluene were added into the plasma samples. Blood samples were stored at -80°C**.**

Statistical Analysis

Each experiments was repeated three times and data were displayed as mean±SD and analyzed through SPSS 22.0 (IBM, USA). Student t-test was applied for results in two groups and oneway ANOVA was for results more than two. P<0.05 was considered to have significant meaning.

RESULTS

The data was collected from 250 patients from which 150 females and 100 males. In the second group C-reactive protein is higher than in the first group with statistical significance (p = 0.02). Leukocytes have a less important value in establishing proinflammatory and cardiovascular risk contribution in patients with metabolic syndrome compared with C-reactive protein.

Table 1: Leukocytes and CPR values in study groups.

	CRP (mg/dl)	Leukocytes (/µl)
First group	0.79±0.8	12600±1000
Second group	0.9±0.8	14100±1000
P	0.02	0.07

Compared to normal cell line, EIF3K expressed lower in inflammatory cell line. Furthermore, overexpressed IEF3K could up-regulate expression of EIF3K in inflammatory cell line and suppressed cell viabilities.

Apoptosis and autophagy were detected as well, which indicated that expression of Bcl-2 was inhibited and expressions of Bax and caspase-3 were promoted.

In autophagy, expression of LC3- was upregulated and LC3- and p62 were suppressed.

Autophagy A, B. Expressions of EIF3K was evaluated by RT-qPCR, P<0.05. C. CCK-8 was used to evaluated cell viabilities in oeNC group and oeEIF3K group, P<0.05. D. RT-qPCR was used to detect expressions of RNAs related to apoptotis, P<0.05. E. proteins were validated by western blot, P<0.05.

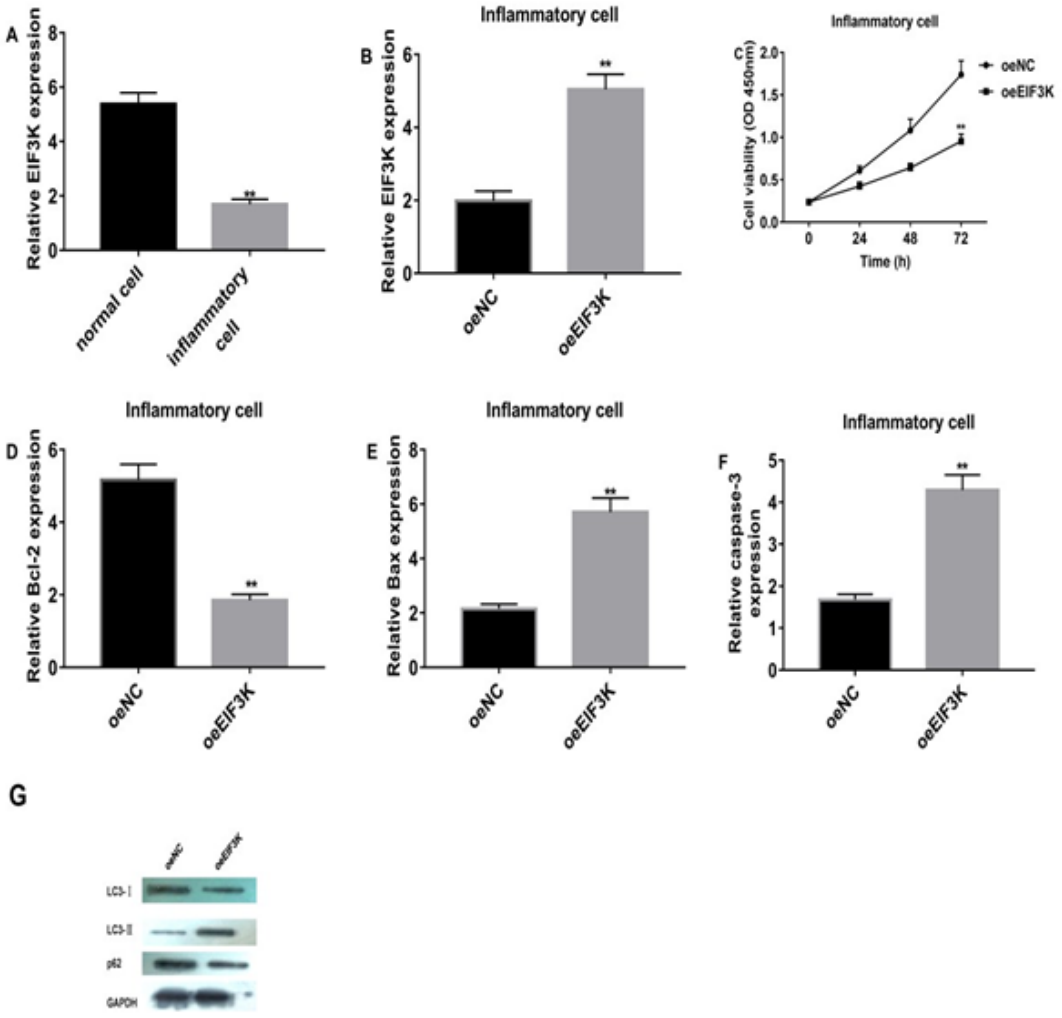

Figure 1. Circular EIF3K expressed lower in inflammatory cells of oviduct and promoted apoptosis and

DISCUSSION

Pro-inflammatory mechanisms can be considered as a base of increased cardiovascular risk. Proinflammatory activity is more significant if metabolic syndrome is characterised by more elements. The results we obtained ascertain that inflammatory status is increased in patients diagnosed with metabolic syndrome (significantly statistic in subjects that associate more than 3 elements). Inflammatory injury has different severity depending on the elements that define metabolic syndrome and on their association. Once the inflammation level increases there is a differentiated prognostic impact for cardiovascular events.[9,10] Metabolic syndrome frequency is progressively increasing and evaluation of proinflammatory risk of this entity is valuable, as assessment of some inflammatory biomarkers implies minimum costs and it can be repeated.[11] In our study CRP proved to be an accurate indicator of inflammation for patients with metabolic syndrome. In subjects with acute coronary syndrome, stroke, periferic vascular disease and sudden death, recent epidemiological data ascertained a positive association between CRP levels and clinic manifestations of atherothrombosis.[12] Increased values of CRP represent a predictive marker for unfavourable evolution in patients with unstable angina pectoris after myocardial revascularisation, as well as in patients with metabolic syndrome and diabetes – that suggests its role in atherogenesis.[13-15]

CONCLUSION

It is concluded that obesity is the main factor of metabolic syndrome. Patients diagnosed with metabolic syndrome present an activated inflammatory status. Inflammatory syndrome is expressed according to the number of metabolic syndrome components.

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