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The Connection Between TNF and IL-6 in Persons with and Without Metabolic Syndrome

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Abstract: **Background: Obesity is a chronic low grade inflammatory state associated with the development of insulin resistance, type 2 diabetes mellitus and atherosclerosis. TNF and Interleukin 6 are proinflammatory cytokines which relate starting of immune response.**
The aim of the study: Relationship between TNF and Interleukin 6 in people with and without metabolic syndrome.
Materials and methods: The study involved 131 healthy individuals aged 25-55 years old randomly chosen in Tirana. Data concerning generalities, sex, residence, age, weight, height, abdominal circumference, systolic blood pressure, diastolic blood pressure , pulse, BMI, cholesterol, triglycerides, LDL, HDL, glycemia, TNF , interleukin 6 , insulinemia and HOMA-IR were collected. Insulin resistance and insulin sensitivity were calculated and compared within people with and without MS. MS prevalence was determined according IDF criteria.
Results: We found in people with and without MS significant difference between Interleukin 6 levels (P 0,01) and between TNF alpha levels (P<001).
In subjects with MS we observed an important correlation between interleukin 6 and insulinemia (p=0.029, r=0.292)and between TNF and total cholesterol (p=0.001, r=0.315). Also a significative correlation was noticed between Homa-IR and TG in the MS population (p=0.001, r=0.489).
Conclusions: According our results metabolic syndrome subjects have a higher inflammatory state compared to the healthy population. The results show a strong correlation of pro inflammatory cytokines levels with insulinemia, triglycerides and cholesterolemia suggesting an important role of pro inflammatory cytokines in the *metabolic syndrome pathogenesis.*

Keywords: **MS – metabolic syndrome IDF – International Diabetes Federation.**

I. INTRODUCTION

Metabolic syndrome is a cluster of conditions — increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels — that occur together, increasing your risk of heart disease, stroke and diabetes. The modern rise in obesity and its strong association with insulin resistance and type 2 diabetes have elicited interest in the underlying mechanisms of these pathologies. The discovery that obesity itself results in an inflammatory state in metabolic tissues ushered in a research field that examines the inflammatory mechanisms in obesity.[1,2]

Adipose tissue was longed view as a passive energy reservoir. But with the discovery of leptin and subsequent identification of other adipose tissue-derived humoral mediators (e.g. , adiponectin and resistin), collectively referred to as "adipokines" [2] , it became clear that adipose tissue is an active endocrine organ that controls energy homeostasis. Obese adipose tissue also secretes various inflammatory cytokines such as IL-6 and TNF-α, and dysregulated production of these proinflammatory mediators over the antiinflammatory adipokine (e.g., adiponectin) is thought to be a central mechanism underlying adverse metabolic and cardio-vascular consequences. Indeed, inflammation is the key process

underlying atherogenesis and the vulnerability of atherosclerotic plaque to rupture, and activation of proinflammatory pathways is known to interfere with insulin signaling and induce insulin resistance[4].

It is noteworthy that the increased secretion of inflammatory mediators seen in obese visceral fat reflects the ongoing chronic inflammation of the adipose tissue itself. Activation of inflammatory pathways in adipocytes impairs triglyceride storage and increases release of free fatty acids, an excess of which is known to induce insulin resistance in muscle and liver [5]. Thus, chronic inflammation appears to be a clinically important change that occurs in adipose tissue when it becomes obese [6]. The sequence of events that leads to adipose inflammation and how those events are regulated are still poorly understood, however.

Adipose tissue pathogenicity differs according to adipose tissue localization, visceral, or subcutaneous. Visceral adiposity seems to be an independent predictor of insulin sensitivity, impaired glucose tolerance, elevated blood pressure ,and dyslipidemia. Visceral fat is a highly active tissue from the metabolic point of view. It is apparently more susceptible to lipolysis than subcutaneous adipose tissue and is associated with higher production of TNF-α , plasminogen activator inhibitor-1 (PAI-1, IL-6), and CRP .On the other hand, it is a feabler producer of adiponectin, an adipokine more strongly correlated with subcutaneous fat. Bahceci and collaborators found a positive correlation between adipocyte size and TNF-α, IL-6, and high-sensitivity CRP. On the other hand, adiponectin was found to be negatively correlated with adipocyte size.

Adipocytes behave as immune cells and are able to synthesize and release a huge amount of proinflammatory adipokines and cytokines including leptin, resistin, PAI-1, IL-6, TNFα, retinol-binding protein 4, IL-1β, monocyte chemoattractant protein-1 (MCP-1), CRP, macrophage migration inhibitory factor (MIF), chemokines from the CC and CXC families, and more recently described cytokines such as IL-18 and IL-33 ,most of which, are involved in insulin resistance.
The aim of the study: Relationship between TNF and Interleukin 6 in people with and without metabolic syndrome.

2. MATERIALS AND METHODS

The study involved 131 healthy individuals (males and females) aged 25-55 years old randomly chosen in Tirana. Data concerning generalities, sex, residence, age, weight, height, abdominal circumference, systolic blood pressure , diastolic blood pressure , pulse, BMI, cholesterol, triglycerides, LDL, HDL, glycemia, TNF , interleukin 6 , insulinemia and HOMA-IR were collected. Insulin resistance and insulin sensitivity were calculated and compared within people with and without MS. MS prevalence was determined according IDF criteria. Before entering the study, a physical examination and appropriate laboratory tests were performed. All study participants had no cardiovascular disease, hypertension, infections, or other serious medical problems; all were non-smokers and were not taking any anti-inflammatory grugs or drugs known to affect glucose and lipid metabolism. All analyses were performed after an overnight fast.

Anthropometric measurements:

The BMI was calculated as body weight in kilograms divided by height in meters squared. The waist circumference was measured at the smallest circumference between the waist and the thighs.

Statistical Analysis

Continuous data were presented in the average value and standart deviation .

The relationships between variables were studied with the Pearson correlation .

Discrete data presented in absolute value and percentage .

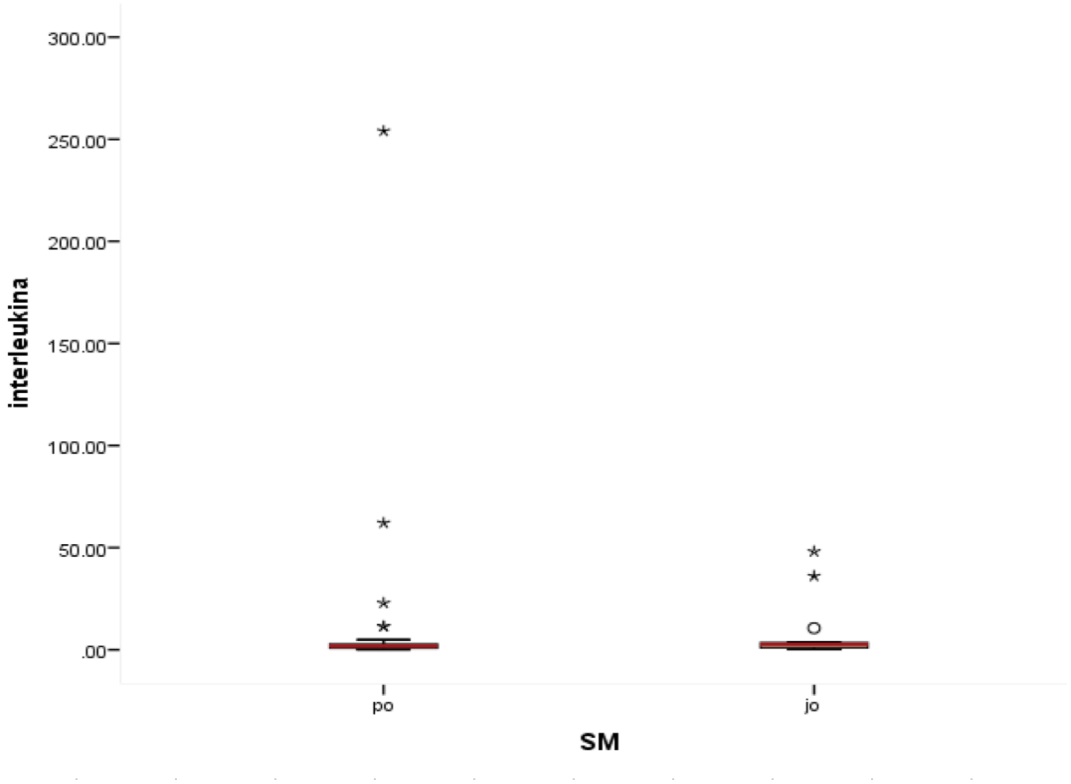
Differences between the two groups for continuous quantitative variables was performed through student test .

Data analysis was performed with SPSS statistical package , version 20, (Statistical Package for Social Sciences).

The level of significance was accepted at $P < 0.05$

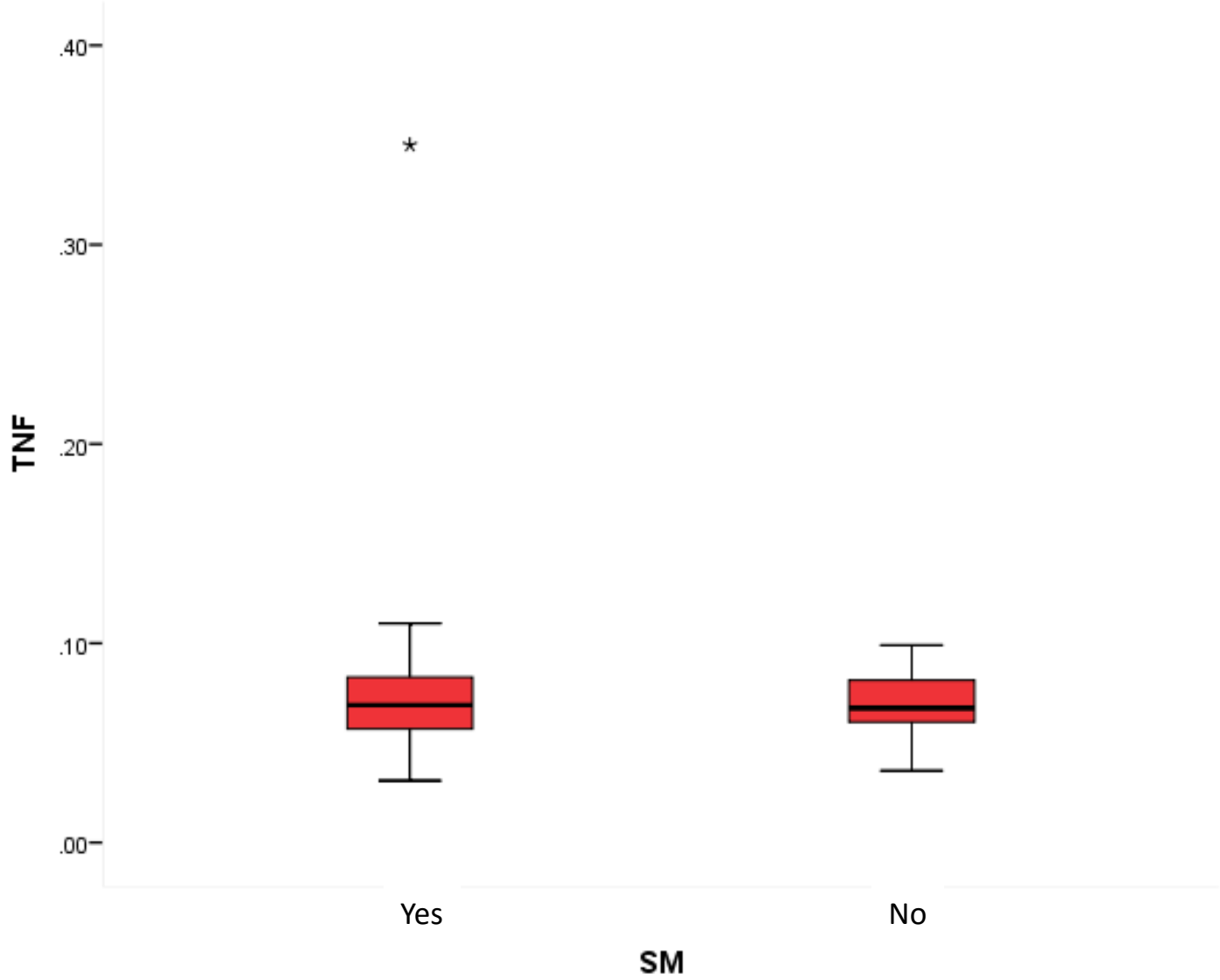
3. RESULTS

We found significant difference between Interleukin 6 levels (P 0,01) in people with and without MS.



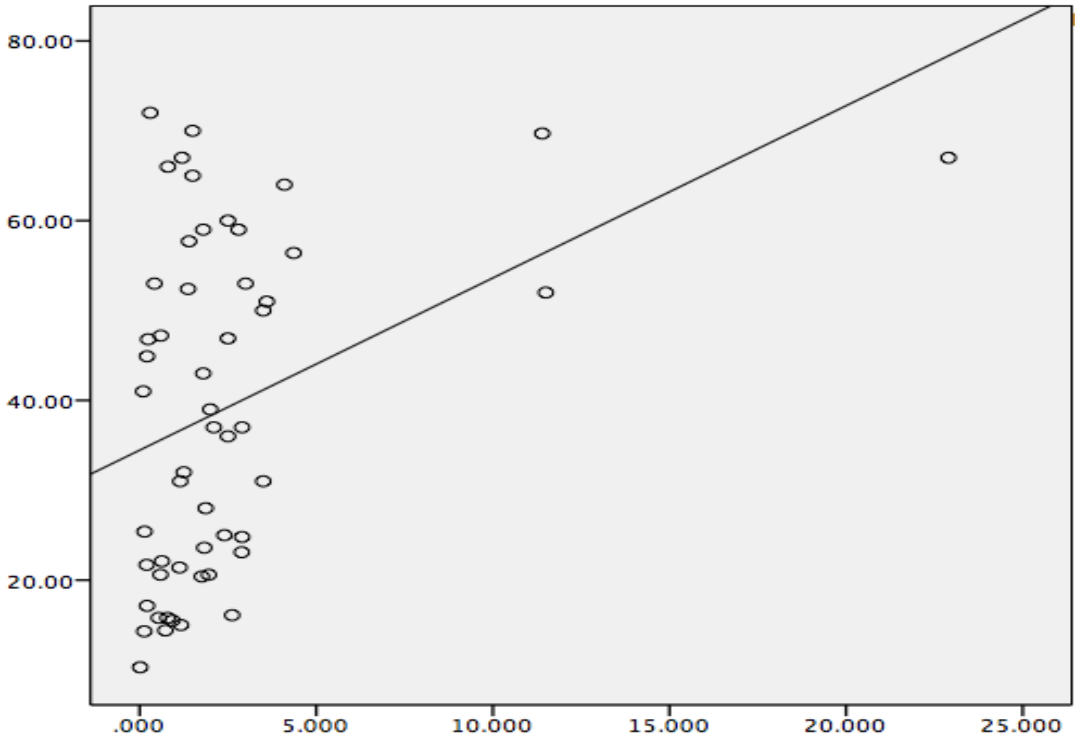
Difference of IL-6 between Metabolic Sindrome and not MS population

We found significant difference between TNF alpha levels (P<001) in people with and without MS.



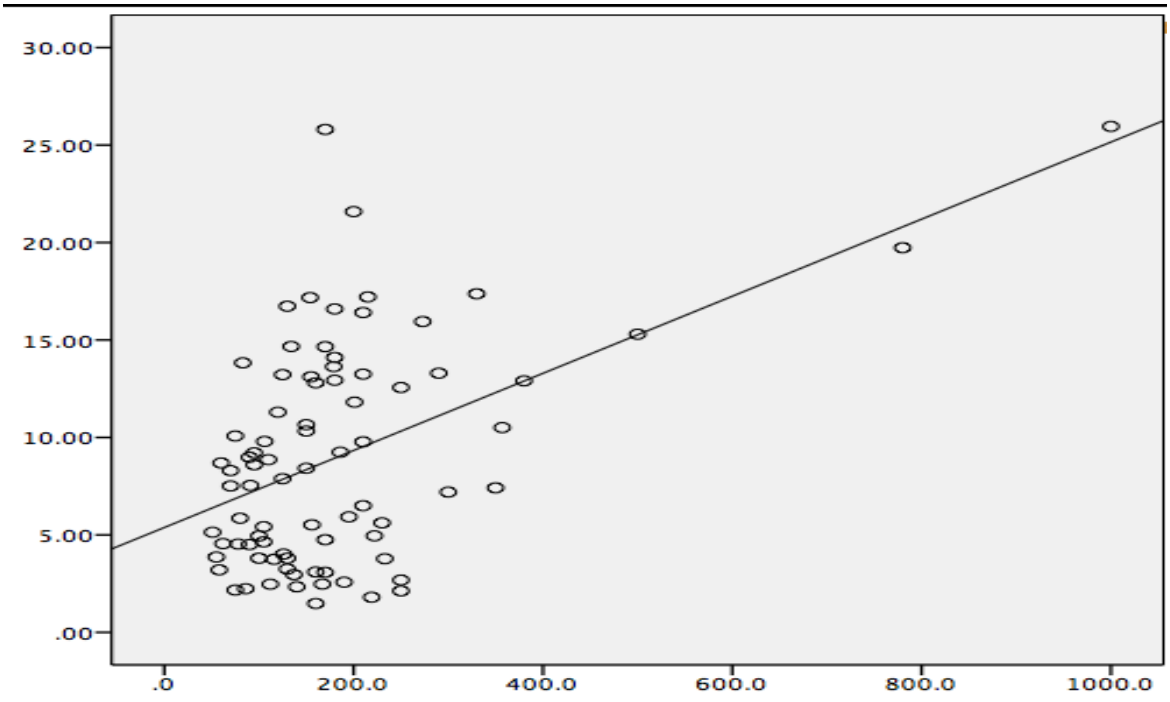
Difference of TNF-α between Metabolic Sindrome and not MS population

We observed an important correlation between interleukin 6 and insulinemia (p=0.029, r=0.292) in subjects with MS.



Correlation of insulinemia and IL=6 in the Metabolic Sindrome population

Also a significative correlation was noticed between Homa-IR and TG in the MS population (p=0.001, r=0.489).



Correlation of HOMA-IR and Triglycerides in the Metabolic Sindrome population

4. CONCLUSIONS

According to our results, metabolic syndrome subjects have a higher inflammatory state compared to the healthy population. The results show a strong correlation of pro inflammatory cytokines levels and insulinemia, triglycerides and cholesterolemia suggesting an important role of pro inflammatory cytokines in the metabolic syndrome pathogenesis.

REFERENCES

[1] Inflammatory mechanisms in obesity. Gregor MF, Hotamisligil GS. Annu Rev Immunol. 2011;29:415-45. doi: 10.1146/annurev-immunol-031210-101322.

[2] Chronic Inflammation in Obesity and the Metabolic Syndrome. Rosário Monteiro, Isabel Azevedo. Mediators Inflamm. 2010; 2010: 289645.

[3] Kadowaki T, Yamauchi T, Kubota N, Hara K, Ueki K, Tobe K. Adiponectin and adiponectin receptors in insulin resistance, diabetes, and the metabolic syndrome. J Clin Invest 116(7):1784-1792, 2006

[4] Hotamisligil GS. Inflammation and metabolic dis-orders. Nature 444(7121):860-867, 2006

[5] Guilherme A, Virbasius JV, Puri V, Czech MP. Adipocyte dysfunction linking obesity to insulin resistance and type 2 diabetes. Nat Rev Mol Cell Biol 9(5):367-377, 2008.

[6] Hosogai N, Fukuhara A, Oshima K, Miyata Y, Tanaka S, Segawa Furukawa S, Tochino Y, Komuro R, Matsuda M, Shimomura I. Adipose tissue hypoxia in obesity and its impact on adipocytokine dysregulation. Diabetes 56(4):901-911, 2007.