

Relevance of dietary and lifestyle patterns in metabolic syndrome management

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Introduction

Metabolic syndrome (MS) has become a common metabolic disorder concurrently with the increased prevalence of obesity. Central obesity and insulin resistance are recognized as the two underlying disorders of the syndrome as well as the most important risk factors for cardiovascular diseases. Other cardiovascular risk factors associated with MS include type 2 diabetes, hypertension, high triglycerides and low high-density lipoprotein cholesterol (HDL). A more profound insight in the MS etiology revealed that biomarkers of inflammation (C-reactive protein, CRP) or increased oxidative stress (oxidized low density lipoprotein, LDL) have an important role as developing factors also (Bonora, 2006). Comprising that the pathogenesis of MS involves both genetic and acquired factors (dietary habits, physical activity), and the last have become increasingly relevant, effective dietary modification may help in MS prevention and improvement of overall health as well as quality of life. Three or more specific metabolic components out of five are required to diagnose MS. Often the relationship between known predicting factors and different metabolic components is not obvious making it difficult the introduction of a well-defined treatment for patients with different combinations of metabolic components (Yu et al., 2021). The prevalence of the MS and cardiovascular disease is expected to rise along with the global obesity epidemic. In fact, the adipose tissue was postulated to be at the root of the problem (Grandy, 2006). Hence, an emphasis should be given whether the features of MS have a unifying etiology. This will allow better profiling of pre-

symptomatic individuals to be done and more effective and timely management to be conducted.

Materials and methods

A questionnaire composed of 2 groups of questions was electronically distributed via a link to adults who were requested to answer the questions on a voluntary basis. In the first part of the questionnaire, the respondents were asked to give objectively the socio-demographic and general data (age, education level, occupation, financial stability). The second part requested information related to the participant's lifestyle (regular physical activity, alcohol drinking, cigarette smoking), dietary attitude and behavior (number of meals/day, caloric intake, amount of food and preference of certain products, dietary salt intake, consumption of animal and vegetable fats and sugars), anthropometric data: height, weight and waist circumference and results of blood analysis (blood glucose, TG, LDL and HDL levels). The survey included 317 participants of which women were the vast majority, while only 24 men were included. For the assessment of prevalence of metabolic syndrome in adult population in the Republic of North Macedonia and its specific characteristics closely related to dietary and lifestyle patterns, a descriptive approach was applied.

Results and discussion

This study provides new information about MS in adult Macedonian population in two important dimensions. First, pooled analysis of a relatively large

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sample suggests that approximately 4.5% of respondents have MS. The prevalence is less than the recently reported worldwide, 20-25% of adults (do Vale Moreira et al., 2020). However, the development of MS, especially early in adulthood can lead to an elevated burden of cardiovascular diseases indicating the prevalence should be sustained at lowest possible level. According to the Health Insurance Fund of Republic of North Macedonia annual report for 2020 (Report for consumption of drugs in 2020), the most often used drugs are antihypertensives and antidiabetics. The second important information is that all participants with MS had high TG, elevated fasting blood glucose levels, and hypertension as the most prevalent components. This finding raises the possibility that high TG, fasting blood glucose and hypertension may be key markers in identifying early pathology associated with MS development. LDL and HDL values reported by some participants were not interpreted due to insufficient number of data provided. Respondents with MS presented higher values for abdominal circumference and higher BMI values (50% in a range of 25-30 and 42.86% over 30). Dietary salt intake, small to moderate alcohol consumption, cigarettes smoking, consumption of animal fats and sugars were found to be insignificant risk factors for the development of MS since no significant differences for these criteria were found between subjects with and without MS. Further, no apparent correlation of dietary animal fats and MS was noted (73.17% of the health respondents prevailed animal fats in the diet vs. 78.57% of the patients). Although there is ongoing research interest to assess the effects of an unhealthy lifestyle on the risk of MS, some aspects of this relationship remain controversial, which is in accordance with the results revealed herein. Indeed, high number of the respondents with MS declared hypertension (71.43%), diabetes and/or congestive heart failure in their families pointing out the significant influence of the genetic predisposition. High number of healthy subjects also reported the existence of at least one disease (62.7%) which may be risk for MS development later in life. Drug therapy has been shown as insufficient to control the prevalence of MS and intensive lifestyle changes have been suggested (Brown et al., 2009). To reduce the risk for MS, multiple interferences of genetic factors and the impact of lifestyle modifications seem to be the most relevant to study. It is well known that healthy habits like non-smoking, moderate food and alcohol intake, regular exercise can decrease the risk of MS, though in this study only sedentary lifestyle had strict correlation with the risk of MS (35.71% of MS respondents vs. 19.8% healthy subjects). In addition, diet recommendations which can provide the most effective prevention are still not precisely defined. Development of an optimal dietary pattern for individuals with MS is an imposing question

yet to be answered. Various popular diets can lead to weight loss, at least over the short time; however, dietary adherence is the most important factor for long-term weight management rather than diet composition. When appropriate knowledge regarding specific components tightly related to dietary patterns is provided, it would be possible to answer the question is there a dietary pattern that might improve metabolic parameters, even in absence of weight loss.

Conclusion

The influence of social, dietary and lifestyle habits on the MS prevalence and associated specific components among adult population in Republic of North Macedonia was investigated. Substantially low prevalence was found compared to global prevalence of metabolic syndrome, while the identified components did not support the proposed overwhelming role of dietary factors in MS pathogenesis. Hence, further studies are needed to elucidate the influence of dietary patterns and intervention in MS prevention and consequent chronic diseases.

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