PREVALENCE OF METABOLIC SYNDROME AND OF CARDIOVASCULAR RISK FACTORS

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Rezumat

Obezitatea, componentă a sindromului metabolic, reprezintă o problemă redutabilă de sănătate publică, a cărei prevalență este în continuă creștere în țările europene. Reușita terapeutică a pacientului cu sindrom metabolic necesită o abordare multidisciplinară ce are în vedere modificarea stilului de viață, reducerea greutății corporale, ameliorarea continuă și dinamică a dietei, combaterea sedentarismului, normalizarea valorilor tensionale, ale glicemiei și ale parametrilor lipidici. Studiul realizat este unul retrospectiv desfășurat în cadrul Spitalului Clinic de Recuperare din Iași, ce a cuprins un număr de 4627 de pacienți internați în Secția Clinică de Recuperare Cardiovasculară în perioada ianuarie 2011 - decembrie 2015 cu diagnosticul de sindrom metabolic conform definiției OMS (lotul 1) sau cu alte comorbidități (lotul 2). Lotul 1 a însumat un număr de 1064 de pacienți diagnosticați cu sindrom metabolic. În acest lot au predominat persoanele de gen feminin, fumătoare. De asemenea, au fost găsiți mai mulți pacienți cu hipertrofie de ventricul stâng și boală coronariană decât în lotul 2. Majoritatea pacienților cu sindrom inflamator s-au regăsit în lotul pacienților fără sindrom metabolic (lotul 2). Rezultatele studiului nostru confirmă faptul că sindromul metabolic este un cluster de anomalii ale căror evoluție determină apariția bolilor coronariene. Toate acestea ar pleda pentru tratarea sindromului metabolic ca și principală metodă de prevenție a bolilor cardiovasculare.

Cuvinte cheie: *sindrom metabolic, obezitate, hipertensiune arterială, dislipidemie.*

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Abstract

Obesity, a component of the metabolic syndrome, is a rising public health problem, continuously increasing in the European countries. The therapeutic success of the patient with metabolic syndrome requires a multidisciplinary approach to lifestyle changes, weight loss, continuous and dynamic dietary improvement, sedentary reduction, normalization of blood pressure, glycemia and lipid parameters. We performed a retrospective study that was conducted in the Clinical Rehabilitation Hospital in Iasi, with 4627 patients that were admitted in the Cardiovascular Rehabilitation Clinic from January 2011 to December 2015 with the diagnosis of metabolic syndrome according to WHO definition (Group 1) or with other comorbidities (Group 2). In the first group were included 1064 patients diagnosed with metabolic syndrome. This group has predominantly smoking female patients. Also, in group 1 were diagnosed more patients with left ventricular hypertrophy and coronary heart disease compared to group 2. Most of the patients with inflammatory syndrome were included in the group without metabolic syndrome (group 2). The results of our study confirm that metabolic syndrome is a cluster of abnormalities whose evolution determines the development of coronary heart disease. All this would advocate for treating metabolic syndrome as the primary method of preventing cardiovascular disease.

Keywords: metabolic syndrome, obesity, high blood pressure, dyslipidemia.

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Introduction

Obesity, a component of the metabolic syndrome, is a rising public health problem, continuously increasing in the European countries.

Data offered by the WHO highlight the doubling of the obesity in the time interval 1980-2008, with almost equal values for both men and women[1]. Several definitions of the metabolic syndrome were formulated in time, deriving from the wish of including all its components[2].

The therapeutic success of the patient with metabolic syndrome requires a multi-disciplinary approach to lifestyle changes, weight loss, continuous and dynamic dietary improvement, sedentary reduction, normalization of blood pressure, glycemia and lipid parameters[3]. To maintain the values within the optimal parameter range, the patients need to be included in the cardiometabolic rehabilitation program. The therapeutic decisions, together with the medical counseling program, are adjusted based on the risk grading (according to the Framingham score), and the therapeutic targets are targeting the improvement of the components of the metabolic syndrome according to the WHO definition[4,5].

The purposes of this study complete with concrete data the topicality of the metabolic syndrome.

The first purpose is the identification of prevalence of metabolic syndrome at a regional level, on a large patient group from a cardiovascular rehabilitation clinic, and the second purpose is the identification of prevalence of conventional and non-conventional cardiovascular risk factors in two study groups: patients with metabolic syndrome and patients without metabolic syndrome.

Material and method

A retrospective study was performed that was conducted in the Clinical Rehabilitation Hospital in Iasi, that had the objective of studying 4627 observation sheets of patients hospitalized in the Cardiovascular Rehabilitation Clinic between January 2011 - December 2015. Among the inclusion criteria we note the presence of the metabolic syndrome according to the WHO definition. As excluding criteria we mention age below 18 years and above 85 years, patients who do not meet minimum 3 of the 5 diagnostic criteria for metabolic syndrome. Subsequently the patients were divided in 2 groups: patients with metabolic syndrome (Group 1) and patients without metabolic syndrome with various other co-morbidities (Group 2).

All data were processed statistically in SPSS version 18 and Excel.

Results and discussions

The inclusion criteria allowed the study of prevalence of metabolic syndrome; the number of diagnosed patients was 1064, representing 22.64% of the total observation sheets studied (Fig. 1). Dividing by gender highlighted the presence of metabolic syndrome in 58% of females and 42% of males. For the correct assessment of obesity, of metabolic syndrome and implicitly of the cardiovascular risk both the body mass index and the body fat percentage need to be calculated. Recent studies show that women have a higher body fat percentage and a lower body mass index compared to men[6,7].

Statistical analysis showed a statistically significant difference (p<0.01) between the patients diagnosed with metabolic syndrome and the total of observation sheets that were

studied. In order to establish the diagnosis of metabolic syndrome according to the WHO definition we need the presence of minimum 3 of the 5 criteria: hypertension, diabetes mellitus, high cholesterol values, low HDL-cholesterol, and obesity. We will sub-divide by each specific criterion its incidence within the studied disease[8,9].

Hypertension had a prevalence of 96.5% patients with metabolic syndrome (Group 1) and of 81.54% in those without metabolic syndrome (Group 2). A statistically significant difference is noted between patients with hypertension within the group with metabolic syndrome (Group 1) compared to Group 2 (p<0.001) (Fig. 2). The prevalence of diabetes mellitus was of 61.6% for Group 1, and of 23.16% for Group 2. A statistically significant difference is noted between patients with diabetes mellitus who have metabolic syndrome (Group 1) compared to Group 2 (p<0.001) (Fig. 2).

High blood pressure values lead to left ventricular hypertrophy, best objectified by echocardiographic measurements. The prevalence of left ventricular hypertrophy was of 68.7% for Group 1, and of 53.64% for Group 2. A statistically significant difference is noted between patients with left ventricular hypertrophy within the group without metabolic syndrome (Group 2) and the group with metabolic syndrome (p<0.001) (Fig. 3).

Of the criteria of metabolic syndrome the highest percentage in our study is detained by obesity. Current data offered by the WHO regarding the prevalence of obesity highlight the fact that 35.5% of men and 35.8% of women, respectively, suffer from obesity. It should be noted that there is a great number of young people (35%) aged above 20 years who are overweight due to food intake. In the category of patients included in the study the majority are of female gender[1].

Current data reveal the presence of inflammatory syndrome within the metabolic syndrome. A faithful marker is C reactive protein (CRP)[10,11]. In our study, most patients with inflammatory syndrome were included in the group without metabolic syndrome (group 2). C reactive protein changes had a prevalence of 0.9% for those with metabolic syndrome, and 2.18% for those without metabolic syndrome. A statistically significant difference is noted between patients with inflammatory syndrome within the group without metabolic syndrome (Group 2) and the group with metabolic syndrome (p<0.001) (Fig. 4).

One of the main risk factors of cardiovascular diseases is represented by smoking. From the studied group, 27.4% of the total patients with metabolic syndrome (Group 1) were smokers compared to 23.1% of the total patients without metabolic syndrome (Group 2). A statistically significant difference is
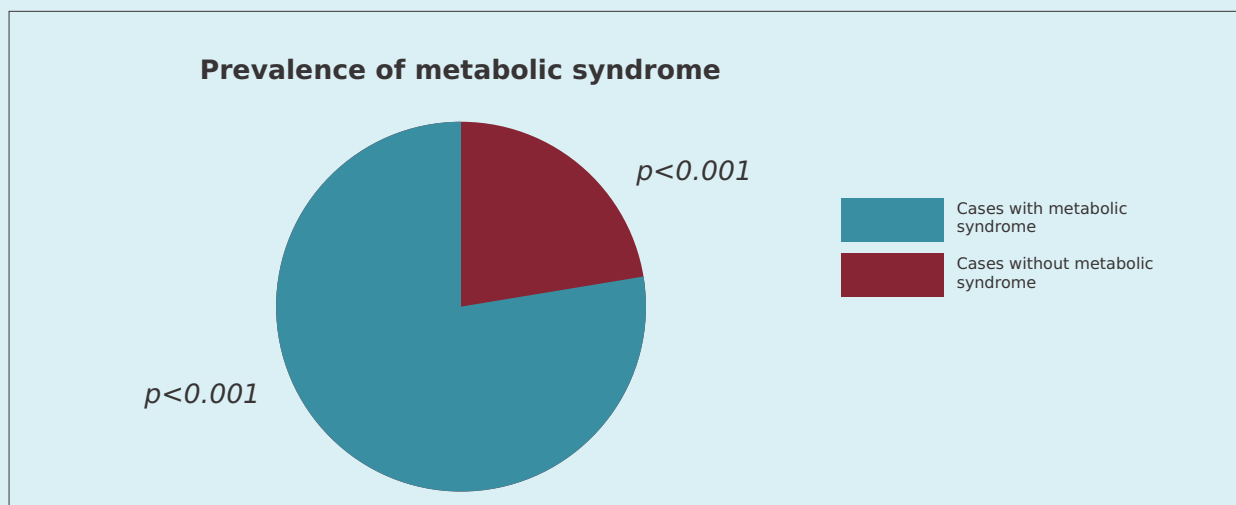
Prevalence of metabolic syndrome

$p<0.001$

$p<0.001$

Cases with metabolic syndrome

Cases without metabolic syndrome

Figure 1. *Distribution by the presence of metabolic syndrome within the study*

Prevalence

96,5

81,54

$p<0,006$

81,54

$p<0,001$

23,16

$p<0,037$

Hypertension   **Diabetes mellitus**
96,5   81,54
81,54   23,16

S t u d y   g r o u p s

Cases with metabolic syndrome

Cases without metabolic syndrome
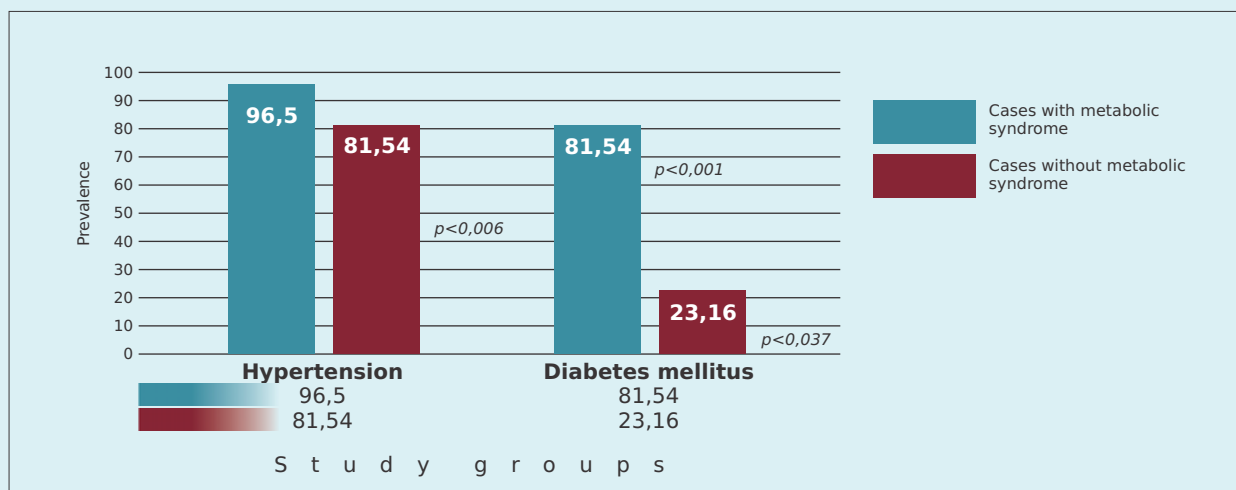
Figure 2. *Distribution by the presence of hypertension/DM within the study*

Prevalence

$p<0,001$

68,7

53,64

$p<0,001$

LVH
68,7
53,64

Cases with metabolic syndrome
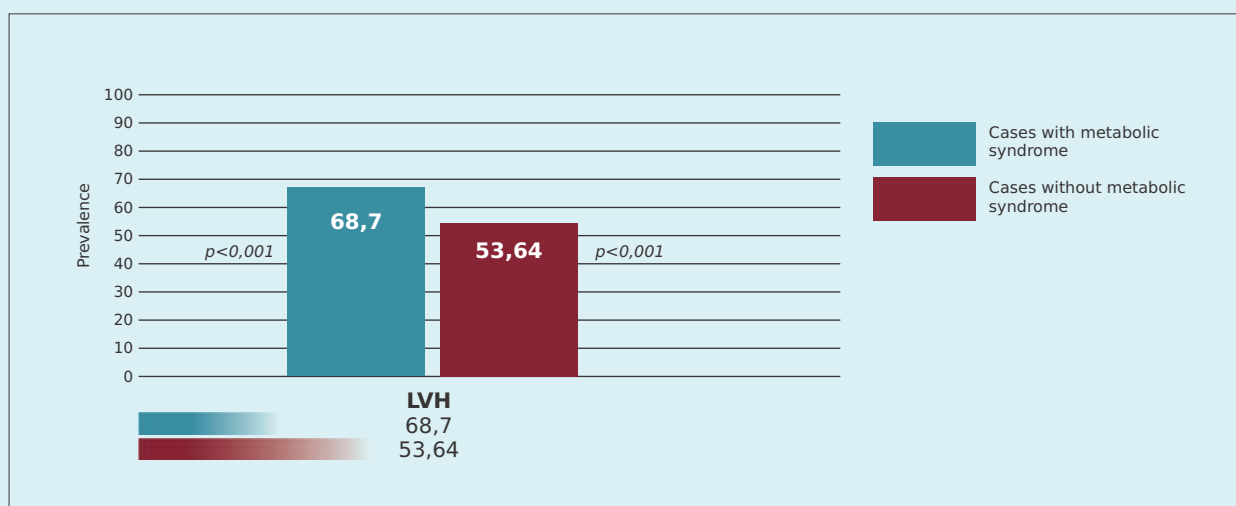
Cases without metabolic syndrome

Figure 3. *Distribution by the presence of LVH within the study*

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noted between smoker patients within the group without metabolic syndrome (Group 2) and the group with metabolic syndrome (Group 1) (p<0.001) (Fig. 5). Recent studies demonstrate that smoking is associated with an increased risk of developing metabolic syndrome in both women and men[12]. Recent data sustain that patients who gave up smoking and followed a nicotine replacement therapy for 3 months had higher values of systolic blood pressure, basal glycemia, but also an increase of body fat[13].

As metabolic syndrome causes an important heart impairment, we have calculated the percentage of patients who also have coronary heart disease. Thus the presence of coronary heart disease was noted in 36.5% from the group of patients with metabolic syndrome (Group 1) and 29.88%, respectively, of those without metabolic syndrome (Group 2). The statistical analysis of data highlighted a statistically significant difference between the number of patients with coronary heart disease from Group 1 versus Group 2 (p<0.001). Recent studies support the need of implementation of a prevention program for these patients[14,15].

Conclusions

Metabolic syndrome is a cluster of abnormalities, including hypertension, central obesity, atherogenic dyslipidemia, whose main complication is the development of coronary heart disease.

In our study it is confirmed that the main cardiovascular risk factors are: the smoker status, the presence of inflammatory syndrome, hypertension, obesity, type 2 diabetes mellitus. Almost a quarter of the studied patients were diagnosed with metabolic syndrome. The prevalences of cardiovascular risk factors in patients with metabolic syndrome were higher (1.5 times higher) than in those without metabolic syndrome.

References

1. Heinsch R. Avizul Comitetului Economic și Social European privind consecințele îmbătrânirii populației asupra sistemelor de sănătate și de protecție socială (aviz exploratoriu). Jurnalul Oficial al Uniunii Europene. 2011/C 44/02, p 10-16.

2. Diabetes Canada Clinical Practice Guidelines Expert Committee, Punthakee Z, Goldenberg R, Katz P. Definition, Classification and Diagnosis of Diabetes, Prediabetes and Metabolic Syndrome. Can J Diabetes. 2018;42 Suppl 1:S10-S15.

3. O'Neill S, O'Driscoll L. Metabolic syndrome: a closer look at the growing epidemic and its associated pathologies. Obes Rev. 2015;16(1):1-12.

4. Wang H, Sun Y, Yi X, Zhang L. Evaluation of the Framingham risk score and pooled cohort risk equation for prediction of cardiovascular risk in low resource areas: Insights from Asian rural population. Int J Cardiol. 2018;265:237.

5. Fonseca FAH, Izar MCO. Prevalence of Metabolic Syndrome and Framingham Risk Score in Vegetarian and Omnivorous Apparently Healthy Men. Arq Bras Cardiol. 2018;110(5):438-439.
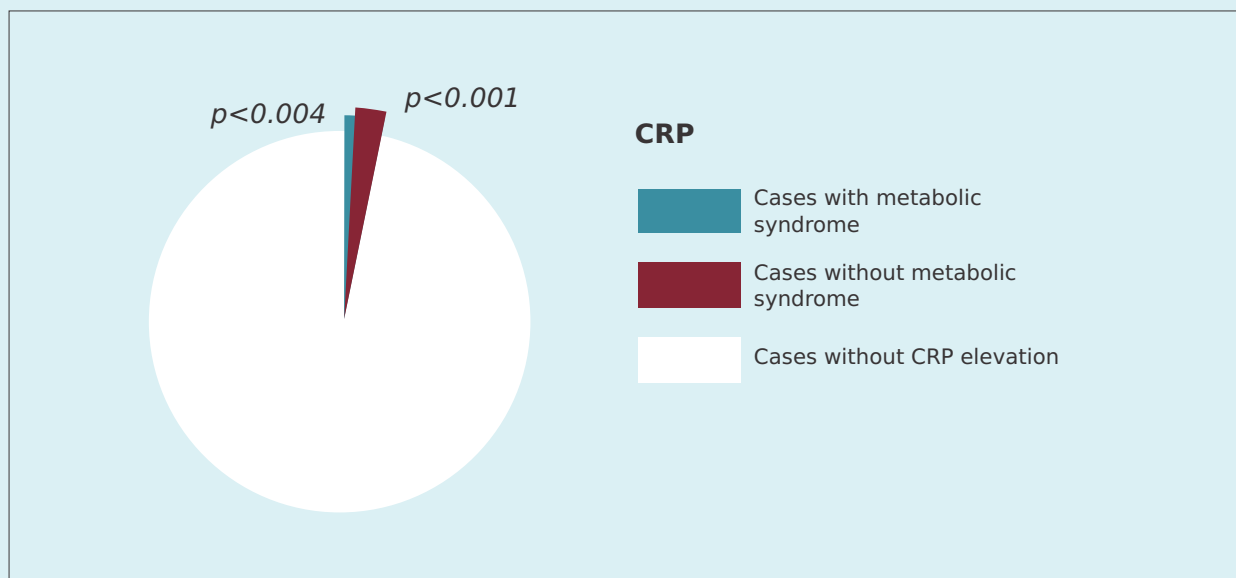
6. Vanavanan S, Srisawasdi P, Rochanawutanon M,

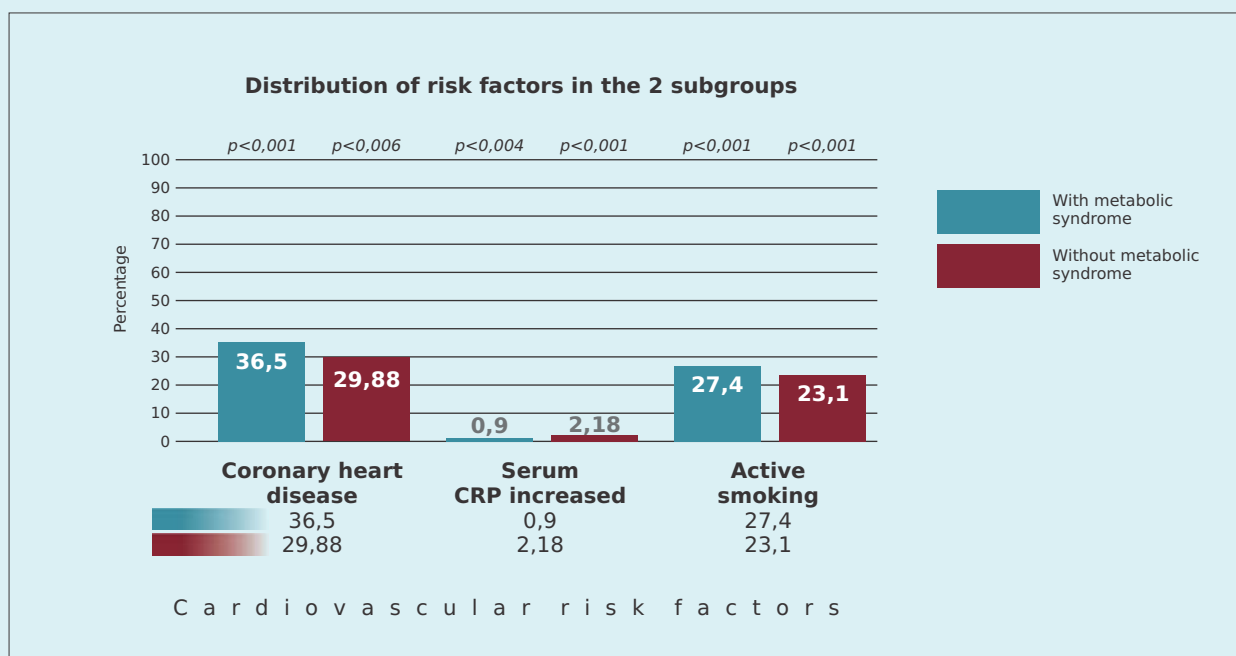**Figure 4.** *Distribution by the presence of inflammatory syndrome within the study*

Figure 5. *Distribution by the presence of coronary heart disease and smoking within the study*

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Kumproa N, Kruthkul K, Kroll MH. Performance of body mass index and percentage of body fat in predicting cardiometabolic risk factors in Thai adults. Diabetes Metab Syndr Obes. 2018;11:241-253.

7. Schorr M, Dichtel LE, Gerweck AV et al. Sex differences in body composition and association with cardiometabolic risk. Biol Sex Differ. 2018;9(1):28.

8. Cerezo C, Segura J, Praga M, Ruilope LM. Guidelines updates in the treatment of obesity or metabolic syndrome and hypertension. Curr Hypertens Rep. 2013;15(3):196-203.

9. Grundy SM, Cleeman JI, Daniels SR et al. Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement. Circulation. 2005;112(17):2735-52.

10. Ren Z, Zhao A, Wang Y et al. Association between Dietary Inflammatory Index, C-Reactive Protein and Metabolic Syndrome: A Cross-Sectional Study. Nutrients. 2018;10(7). pii: E831.

11. Stafeev IS, Menshikov MY, Tsokolaeva ZI, Shestakova MV, Parfyonova YV. Molecular Mechanisms of Latent Inflammation in Metabolic Syndrome. Possible Role of Sirtuins and Peroxisome Proliferator-Activated Receptor Type γ. Biochemistry (Mosc). 2015;80(10):1217-26.

12. Kang JH, Song YM. Association between cotinine-verified smoking status and metabolic syndrome: analyses of Korean National Health and Nutrition Examination Surveys 2008-2010. Metab Syndr Relat Disord. 2015;13(3):140-8.

13. Song YM, Chang WD, Hsu HY, Chen MD. A short-term smoking cessation may increase the risk of developing metabolic syndrome. Diabetes Metab Syndr. 2015;9(2):135-7.

14. Riahi SM, Moamer S, Namdari M, Mokhayeri Y, Pourhoseingholi MA, Hashemi-Nazari SS. Patterns of clustering of the metabolic syndrome components and its association with coronary heart disease in the Multi-Ethnic Study of Atherosclerosis (MESA): A latent class analysis. Int J Cardiol. 2018. pii: S0167-5273(17)37027-4.

15. Lan Y, Mai Z, Zhou S et al. Prevalence of metabolic syndrome in China: An up-dated cross-sectional study. PLoS One. 2018;13(4):e0196012.