Chapter 26

Metabolic syndrome: a review and clinical case

Joicy Guerra Arantes

Geovana Pires

Éveny Gonçalves Moura

Ryan Ferreira Cruz

Karen Melyssa Farias Pereira

Dília Vitória Duarte Martins

Cleuber Rodrigues Tavares

Welington Pereira de Oliveira Júnior

ABSTRACT

The term "Metabolic Syndrome" (MS) refers to a cluster of risk factors for cardiovascular disease (CVD), most notably obesity, type 2 diabetes, dyslipidemia, and hypertension, whose pathophysiology is attributed to insulin resistance. Individuals with android-type obesity have high levels of plasma insulin, often associated with glucose intolerance, hypertriglyceridemia, and arterial hypertension, constituting an important metabolic condition, which is also strongly associated with hepatic steatosis. In addition, the increase in triglycerides and the reduction in HDL or drug treatment can be used as an alternative indicator of this syndrome, with a worldwide prevalence of 25%, accounting for 7% of mortality and 17% of deaths related to CVDs. The objective of this study is to analyze the clinical picture of a patient who has a diagnosis with MS, through bibliographic reviews, test results, and medical reports. The patient is a 40-year-old woman, diabetic, hypertensive, and obese, with a family history of diabetes, and her grandmother and mother being affected by The disease. We observed that MS does not refer to a specific disease, but to a set of risk factors, of metabolic origin, with a tendency to group, and that the main aggravating factor observed regarding the patient's health was the lack of preventive care with the health since he had a history of diabetes in his family, which led to the development of the syndrome.

Keywords: Diabetes, Dyslipidemia, Chronic disease, Hypertension, Obesity

1 INTRODUCTION

Metabolic Syndrome (MS) refers to a group of risk factors for cardiovascular disease (CVD), most notably obesity, hypertension, type 2 diabetes, and dyslipidemia, which pathophysiology is attributed to insulin resistance. It is also associated with liver steatosis, known as fat deposition in the liver. In addition, increased triglycerides and reduction of HDL or drug treatment can be used as an alternative indicator of this syndrome (KAHN et al, 2005).

In 1939, the English author H. Himsworth showed that glucose absorption varied from individual to individual according to cellular insulin sensitivity, i.e., higher or lower resistance, which would later explain type 2 diabetes mellitus. However, it was only in 1979 that De Fronzo, in the United States, described the appropriate technique for measuring insulin resistance, calling it the Euglycemic Insulin Fixation Test; it was this technique that enabled the in-depth study of this resistance (LUNA, 2007).

Metabolic Syndrome is based on resistance to the action of insulin (the hormone responsible for glucose metabolism), so it is also known as insulin resistance syndrome. That is: insulin acts less on tissues, forcing the pancreas to produce more insulin, increasing its level in the blood. Some factors that can contribute to its appearance are genetics, being overweight, and the absence of physical activity (VARELLA, 2017).

According to Phiscke (2014), two signs can help identify the development of insulin resistance, they are:

● Acrocórdons: corresponds to a growth of the skin of the neck, leading to the appearance of lesions that resemble small darkened warts, shown in Figure 1.

● darkening of the skin, called hyperpigmentation, in regions of the folds as the inner part of the elbows, armpits, and neck, as shown in Figure 2. In these regions, the skin will look more velvety.

Thus, the metabolic syndrome does not present a well-defined characterization and many important risk factors are still left aside in its evaluation even though it is often associated with the syndrome, such as prothrombotic and pro-inflammatory markers, c-reactive protein, ferritin, among others (LUNA, 2007; KAHN et al, 2005). Therefore, this study aims to try to gather pertinent information about this syndrome and better understand its risk factors.

FIGURE 1. ACROCÓRDONS and ACANTHIC ACANTH IN ARMpit

Figure 1. Acrocórdons and nigricante acanthosis. SOURCE: PHISCKE, Meghana Madhukar; 2018.

FIGURE 2. NIGRICANTE ACANTH IN THE NECK REGION

Figure 2. Nigricante acanthosis in the neck region. SOURCE: PHISCKE, Meghana Madhukar; 2018.

2 GOALS

2.1 OVERALL OBJECTIVE

Review the literature to analyze metabolic syndrome and its effects relating to the specific clinical case.

2.2 SPECIFIC OBJETIVE

● Describe a clinical case of a 40-year-old woman who has metabolic syndrome.

● Investigate the existence of metabolic syndrome according to the factors defined by the criteria of the *International Diabetes Federation* (IDF).

● Compare data obtained using studies, and the diagnosis of the patient.

● Identify clinical approaches to treatment.

3 JUSTIFICATIONS

To confirm metabolic syndrome, the patient must present three of the five factors: blood pressure increases, a waist circumference greater than indicated, high triglycerides, HDL cholesterol below ideal, and fasting glycemia above 126 mg/dL (OLIVEIRA et al., 2020). It can be seen that these factors are all related to bad eating habits and sedentary lifestyles acquired by cultural and social transformations due to economic development and urbanization (DUTRA, CHIACHIO, 2020).

Also according to Dutra and Chiachio (2020), the worldwide prevalence of metabolic syndrome is 25%, being responsible for 7% of mortality and 17% of deaths related to cardiovascular diseases. In addition, MS is already considered one of the world's major public health problems, and probably about 20 to 25% of the world's population may still be able to re-see this syndrome (DUTRA, CHIACHIO, 2020).

According to data from Oliveira (2020), a prevalence of MS in the adult population of 29.6% is recorded in Brazil and there are reports that more than 40% of the population over 60 years of age are affected by the disease.

Although MS is one of the most common metabolic abnormalities today and the largest responsible for cardiovascular events in the population, we still face a scarcity of data. Early detection through epidemiological studies could be of great help to create public health policies to reduce its incidence and adequate treatment (CALVO, 2017).

Based on the data presented, the results add new research parameters to contribute to the medical community, to assist health policies and programs for the prevention of risks and diseases in Brazilian supplementary health.

4 DEVELOPMENT

4.1 METHODOLOGY

      This study was based on a literature review on the Google Scholar, *Scielo*, and *PubMed* websites with the following keywords: metabolic syndrome and insulin resistance syndrome. In addition, it was based on the guidelines of the *International Diabetes Federation* which has a worldwide definition of consensus for metabolic syndrome. The most consulted articles for the preparation of this study are listed in the table below in increasing order of publication and were chosen due to their relevance to the theme, not found many recent studies that addressed metabolic syndrome broadly.

Table 1. Main articles used.

Article name	Year of publication
The metabolic syndrome: time for a critical appraisal: joint statement from the American Diabetes Association and the European Association for the Study of Diabetes	2005
Metabolic Syndrome	2007
An approach to acanthosis nigricans	2014
Diabetes: The Emotional Affected By The Disease	2016
Intervention in Patients with Metabolic Syndrome in the Trapiche Basic Health Unit, in the municipality of Ouro Branco, Alagoas	2017
Impact of Healthy Lifestyle Factors on Life Expectancies in the US Population	2018
Prevalence and Risk Factors Associated with Metabolic Syndrome among Employees Attended at the SESI Outpatient Clinic - Social Service of the Industry of Vitória da Vitóriaa - BA	2020
Prevalence of Metabolic Syndrome and its components in the Brazilian adult population	2020

Table 1. MAIN ARTICLES USED. SOURCE: OWN ELABORATION.

      The clinical case described below is her own, and the patient is a woman known to the authors who were free to report her experience as a carrier of metabolic syndrome.

4.2 CLINICAL CASE

      The patient is a 40-year-old woman who, diabetic, hypertensive, obese, and has a history of diabetes in the family, and her grandmother and mother are affected by the disease. Individuals with android obesity present high levels of plasma insulin, often into glucose reading, hypertriglyceridemia, and arterial hypertension, constituting an important metabolic condition (CARVALHO et al, 2016).

      She discovered hypertension at the age of 29 when she had a heart attack after drinking alcohol with energy, since then she takes the remédios: Losartana and Anlodipine, but depending on her emotional state the blood pressure does not remain stable, changing to high levels, even with the medications.

      He discovered diabetes at the age of 31 due to the onset of symptoms such as weakness, ca nsaço, dry mouth, and polyuria; he sought medical attention, which underwent a dietary reeducation and Meritor

remedy. At the beginning of treatment, the patient's fasting glycemia presented 666 mg/dl and after 10 days of treatment she evolved to 240 mg/dl, also showing improvements in symptoms.

Subsequently, the patient sought an endocrinologist and started another treatment, also with medicines and food reeducation, this time with the help of a psychologist, because, in addition to all the care with the disease, it is necessary psychological care due to the changes that the same will suffer with the change of lifestyle, food, among other things (CARVALHO et al, 2016). However, the patient always discontinued treatment.

5 RESULTS AND DISCUSSIONS

The patient in question covered hypertension at the age of 29 after suffering a heart attack and since then she has been using losartan and amlodipine. Losartan Potassium is a medicine that acts by dilating blood vessels to help the heart pump blood into the body more easily (MEDICINE BULA). Therefore, it serves to reduce high blood pressure. Losartan is the first line of treatment for high blood pressure (hypertension) and is considered efficient and safe by most people.

Anlodipino as well as losartan is indicated as a drug of choice in the treatment of hypertension. Integrating a group of 4 classes of antihypertensive drugs today is recognized as first-line drugs for the treatment of hypertension (BULA DO MEDICAMENTO). Treatment for hypertension in metabolic syndrome aims to reduce cardiovascular and renal morbidity and mortality and prevent metabolic worsening. However, our patient still complains that her pressure is not controlled when she suffers from strong emotions even in the use of these medications, which shows the importance of drug treatment, but also psychological follow-up.

The patient after 31 years had symptoms such as weakness, tiredness, dry mouth, and polyuria; and on the blood glucose test the result was 666 mg/dl, that is, the patient is diabetic. Treatment begins with dietary reduction and doses of Meritor, a medicine that will help along with healthy eating the decrease glycemia levels actually in 10 days the patient obtained a good result with this treatment.

The table below shows the patient's most recent exams and reference values for gender and age.

Table 2. Current exams (november 2022)

Current exams		IDF Reference R-Value
Hypertension	200/160 mmHg	<130/85 mmHg
Fasting blood glucose	118 mg/dL	< 100 mg/dL
Postprandial glycemia	180 mg/dL	< 180 mg/dL for diabetics
Glycated hemoglobin	7,3%	Normal: 4 to 6% Diabetics: < 7%
Total cholesterol	168 mg/dL	< 200 mg/dL
Triglycerides	205 mg/dL	< 150 mg/dL
HDL	33 mg/dL	> 50 mg/dL
VLDL	41 mg/dL	< 30 mg/dL
LDL	94 mg/dL	< 100 mg/dL

Table 2. Current tests. Source: OWN ELABORATION.

From these tests, it is noted that the patient fits into metabolic syndrome because Metabolic Syndrome (MS) is a complex disorder represented by a set of cardiovascular risk factors usually related to central fat deposition and insulin resistance. To present the diagnosis of Metabolic Syndrome, the patient must present three or more of the following components: obesity, hypertriglyceridemia, hypertension, hyperglycemia, and low HDL, in which the patient fits all (KAHN et al., 2005; OLIVEIRA et al., 2020).

Central obesity is constantly associated with dyslipidemia and glucose intolerance. The exact mechanisms are not yet defined, however, there is a hypothesis that it is related to secondary hyperinsulinism and insulin resistance, in addition to sympathetic stimulation (PAULI et al, 2009).

Essential therapies for the treatment of patients with metabolic syndrome are considered: a dietary plan for weight reduction, associated with daily physical exercise, but in the case of the patient who is decompensated, it will also be necessary to use medications. According to Li et al. (2018), adopting a low-risk lifestyle (daily physical exercise for 30 minutes, daily healthy eating, not smoking, and reducing alcohol intake) can increase life expectancy from 8 to 14 years depending on the region.

When there is no effective response of patients with hyperglycemia to non-drug measures, it is important to inserção of one or more antidiabetic agents, to control blood glucose and promote the fall of glycated hemoglobin (BRAZILIAN DIABETES SOCIETY, 2007).

The clinical case described is not isolated, many people even being aware of the importance of practicing physical activities and having a good diet, do not.

> A study by the Qualibest Institute, which involved 703 adults aged 18 years or older, also revealed that the majority (92%) of respondents are afraid of aging and that having health problems is the most feared aspect when it comes to maturity. However, the research also points out that only 43% of them practice physical activities, 45% take care of their health preventively and 47% have a healthy diet (PORTAL ABERJE, 2017).

Hojand nowadays, few people are concerned with the practice of integrative health, even with the quick access to information that is currently available, people still stop seeking what is most useful: preventive health. This is what could prevent more people from becoming dependent on medication, as is the example of this patient.

6 CONCLUSION

Thus, it is concluded that metabolic syndrome does not refer to a specific disease, but to a set of risk factors, of metabolic origin, with a tendency to group. Because of the objectives found, we can observe that it was possible to identify clinical approaches to treatment, compare data obtained through studies with the patient's diagnosis and investigate the existence of metabolic syndrome according to the factors defined by the criteria of the International Diabetes Federation. However, we can conclude that patients should be more careful with their health, doing food reeducation together with the practice of physical exercises, since they are obese and/or already have a family predisposition to diabetes or any metabolic diseases. Moreover, psychological follow-up is extremely relevant.

REFERENCES

1. Besilato de anlodipino [Bula]. **Sandoz**, 2018.

2. CALVO, Aliana Caner. Intervenção em Pacientes com Síndrome Metabólica na Unidade Básica De Saúde Trapiche, no município de Ouro Branco, Alagoas. Trabalho de Conclusão de Curso para obtenção do Certificado de Especialista. **Universidade Federal de Alfenas**, Maceió - Alagoas, 2017.

3. CARVALHO, Bárbara Soares; RODRIGUES, Cassiana Pereira; CATARINO, Elisângela Maura. Diabetes: O Emocional Afetado Pela Doença, **I Colóquio Estadual de Pesquisa Multidisciplinar** - 2016.

4. **DIRETRIZES DA SOCIEDADE BRASILEIRA DE DIABETES**. Tratamento e acompanhamento do diabetes mellitus, 2007. Disponível em: <https://www.cff.org.br/userfiles/file/noticias/Diretrizes_SBD_2007%5B1%5D.pdf>. Acesso em: 03 de janeiro de 2023.

5. DUTRA, Higor Silva; CHIACHIO, Nádia Cristina Ferreira. Prevalência e Fatores de Riscos Associados à Síndrome Metabólica entre os Funcionários Atendidos no Ambulatório do SESI - Serviço Social da Indústria de Vitória da Conquista - BA. **Id on line, Revista Multidisciplinar e de Psicologia**, p. 1102-1115, dezembro de 2020. Disponível em: <https://idonline.emnuvens.com.br/id/article/viewFile/2836/4519>. Acesso em: 23 de outubro de 2022.

6. I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica, **Sociedade Brasileira de Cardiologia**, volume 84, Suplemento I, Abril 2005. Disponível em: <https://www.scielo.br/j/abc/a/qWzJH647dkF7H5dML8x8Nym/?format=pdf&lang=pt>. Acesso em: 02 de novembro de 2022.

7. **INTERNATIONAL DIABETES FEDERATION**. Metabolic Syndrome. Bélgica, 2006. Atualizado em 29/07/2020. Disponível em: <https://www.idf.org/e-library/consensus-statements/60-idfconsensus-worldwide-definitionof-the-metabolic-syndrome#:~:text=IDF%20Consensus%20Worldwide%20Definition%20of%20the%20Metabolic%20Syndrome&text=The%20metabolic%20syndrome%20is%20a,cholesterol%20and%20high%20blood%20pressure>. Acesso em 04 de novembro de 2022.

8. KAHN, Richard et al. The metabolic syndrome: time for a critical appraisal: joint statement from the American Diabetes Association and the European Association for the Study of Diabetes. **Diabetes Care**, Sep 2005.

9. LI, Yanping, et al. Impact of Healthy Lifestyle Factors on Life Expectancies in the US Population. **Circulation**, 2018.

10. Losartana potássica [Bula]. **EMS**.

11. LUNA, Rafael Leite. Síndrome Metabólica. **Ponto de Vista**, Arq. Bras. Cardiol. 88 (5). Publicado em maio de 2007.

12. Meritor [Bula]. **Consulta remédios**, 2022.

13. OLIVEIRA, Laís Vanessa Assunção *et al*. Prevalência da Síndrome Metabólica e seus componentes na população adulta brasileira. **Ciência saúde coletiva**, 25 (11), Nov 2020.

Disponível em: <https://www.scielo.br/j/csc/a/yjdDz8ccXCGgwj4YhVxKmZc/?lang=pt>. Acesso em: 23 de outubro de 2022.

14. Pauli, José Rodrigo et al. Novos mecanismos pelos quais o exercício físico melhora a resistência à insulina no músculo esquelético. **Arquivos Brasileiros de Endocrinologia & Metabologia**, 2009.

15. Pesquisa aponta que brasileiros querem viver muito, mas descuidam da saúde. **Aberje**, 2017. Disponível em: <https://www.aberje.com.br/pesquisa-aponta-que-brasileiros-querem-viver-muito-mas-descuidam-da-saude/>. Acesso em: 05 de novembro de 2022.

16. Phiske, Meghana Madhukar. An approach to acanthosis nigricans. **Indian dermatology online journal**, 2014.

17. VARELLA, Dráuzio. Síndrome metabólica. **Biblioteca Virtual em Saúde**, Ministério da Saúde. Publicado em outubro de 2017.