Technological guide for patients with Metabolic Syndrome: Health promotion

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ABSTRACT

Understanding the pathophysiological mechanisms underlying metabolic syndrome (MS) is crucial for the development of effective preventive and therapeutic strategies, aiming to mitigate its negative impacts on the health of the population. The study aimed to develop an educational technological booklet to promote the health of patients with metabolic syndrome (MS). This was an exploratory, descriptive and technological field study, carried out in a Basic Health Unit (UBS) in Teresina-PI. The study participants were adult women, without restrictions regarding educational level, with a confirmed diagnosis of MS. A semi-structured interview prepared by the researcher was carried out with the study volunteers. After analyzing and interpreting the data, an educational booklet was created, following the phases: Content Systematization;

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Content Composition; by Judges, and finally Semantic validation with professionals. The study revealed that of the 22 women interviewed with Metabolic Syndrome tend to have a specific sociodemographic and clinical profile, 77.27% of them face challenges in maintaining a healthy diet and practicing physical exercise, in addition to 63.63% not knowing the consequences of this syndrome. It was also evident that the lack of knowledge about metabolic syndrome and possible complications can contribute to low adherence to treatments and lifestyle changes, necessary to improve quality of life, morbidity and mortality. The results indicate that the creation of awareness programs, health education, as well as the development of activities and educational materials, such as the educational technological booklet, can contribute to this profile of patients adopting healthier habits, and may be an alternative to change the reality of metabolic syndrome. It is expected that the educational material produced can collaborate with health professionals, patients and family members, in addition to instigating the creation of public policies capable of promoting the prevention and control of complications, with the aim of reducing comorbidities and improving the quality of life of women with metabolic syndrome.

Keywords: Metabolic Syndrome, Health promotion, Technological Primer.

INTRODUCTION

In 1988, Gerald Reaven officially spoke about the Metabolic Syndrome (MS), entitled Syndrome X, which associated insulin resistance, arterial hypertension, dyslipidemia and Diabetes Mellitus (DM), however, it did not include obesity, which is currently considered one of the basal pathogenic generators of metabolic syndrome (Ivanova *et al*., 2017). Therefore, it is also known as insulin resistance syndrome, dyslipidemia, multiple metabolic syndrome, death quartet, obesity syndrome, and New World syndrome (Lee *et al*., 2016).

The incidence of MS in recent decades has been progressively increasing. Recent global estimates show a prevalence of 20-25% in the adult population of this disease (Brazilian Society of Clinical Medicine, 2023). Thus, according to the World Health Organization, this syndrome is responsible for approximately 7% of global deaths, regardless of the cause, and for 17% of those related to cardiovascular diseases (CVD), (World Health Organization, 2020).

A *priori*, people with this syndrome are twice as likely to die, regardless of the cause; are three times more likely to have a heart attack and/or stroke; and are five times more likely to develop type 2 diabetes mellitus (T2DM) (Ramires *et al*., 2018). Second, prevalence varies according to age, sex, ethnicity, diagnosis used, and the group evaluated (Neves *et al*., 2019; Lira *et al*., 2017).

Thus, it is emphasized that the use of educational activities is essential, as they promote health education and allow the exchange of knowledge among them, stimulating the promotion of self-care, through verbal exposure and the use of support material, such as self-explanatory booklets and images (Ramires *et al*., 2018). Therefore, it is considered that educational booklets can serve as an instrument that brings together technical and human issues, in order to humanize user care, favoring self-care, quality of life, and autonomy (Barbosa *et al*., 2020).

MS is a combination of cardiac risk factors that include obesity, high blood pressure, hypercholesterolemia, and dysfunction of glucose metabolism. These conditions can increase the risk of cardiovascular disease (CVD) and type 2 diabetes mellitus. It is essential to make lifestyle changes to combat and prevent MS, such as a healthy diet, regular physical activity, weight control, blood glucose, blood pressure, cholesterol, and hypertension (Saboya *et al*., 2016).

As tools for awareness and control, we can count on educational technologies, which are characterized as an important and significant tool that assists in patient care, and also has the possibility of developing new forms of care that help professionals to teach self-care and develop competence. Thus, educational technology, being a form of health promotion, comes as an instrument capable of facilitating the entire teaching-learning process, including the care of people who have MS (Cortez, 2018).

Given the literary context, the study was justified by the interest in contributing to this patient profile through the elaboration of an educational technological booklet to promote the health of

patients with metabolic syndrome. It is possible to identify the sociodemographic and clinical characteristics of patients with MS; verify the main doubts and difficulties in the control of MS; prepare an educational booklet on metabolic syndrome according to the findings reported by the patients and validate the content and images through evaluation by expert judges.

METHODOLOGY

This research was guided by the recommendations of Resolution No. 466/12 and 510/16 of the National Health Council (CNS) in its legal and scientific aspects, with CAAE number 56710621.2.000.5211. This was an exploratory, descriptive and technological field study carried out in a Basic Health Unit (BHU), located in the east zone of Teresina – PI.

The study participants were adults and it was made available for both sexes (however, during data collection there were only women, no male patient was followed up during data collection), with no restriction on the level of education, with a confirmed diagnosis of MS. The exclusion criteria were: underage patients and patients who, although eligible, were hospitalized during the collection process.

The Community Health Agents (CHA) were responsible for scheduling the patients' interview with the researchers, setting a day and time for it to take place individually, in a reserved room at the UBS. The duration to answer the questions was a maximum of 15 min. Thus, in order to include all selected patients, interviews were conducted twice a week, all in August 2022. The number of participants was defined by the "Snowball" method and the total sample was 22 participants.

Thus, snowball is a sampling technique that uses reference chains, a kind of network (Vinuto et al., 2010), and in this research the reference network was the Community Health Agents.

A *priori*, a semi-structured data collection instrument developed by the researchers was applied to collect sociodemographic information from the participants (age, sex, schooling and family income), and closed questions regarding doubts and difficulties in controlling MS (Do you know what metabolic syndrome is? What are your difficulties in maintaining control of SM? What are your difficulties in maintaining your healthy diet? What medications do you use? Do you know the complications of this pathology? What treatment do you undergo?). A descriptive analysis of the data was performed in order to verify the differences in the means of the numerical data between the groups or categorical data. In addition, the *Statistical Package for the Social Sciences* – SPSS Version 26 (Pereira *et al*., 2018) was used.

The process of constructing the booklet was based on (Reberte et al., 2012), with adaptations and developed in five phases: Phase 1: Systematization of Content; Phase 2: Content Composition; Phase 3: Choice of Illustrations and Layout of the Booklet; Phase 4: Content and Appearance Validation by Judges; Phase 5: Semantic validation with professionals. It was designed using the

Canva app, which is an online graphic design and visual creation tool that allows users to create a wide variety of visual content, such as social media images, posters, presentations, flyers, infographics, invitations, and more. Thus, the *Brainstorm feature was used* (Canva, 2023).

PHASE 1: CONTENT SYSTEMATIZATION

Analysis and interpretation of interviews with professionals

The answers from the questionnaires were the basis for the creation of the technological educational booklet. This material was made with simple language and explanatory figures so that they could be understandable, through the presentation in the form of an *e-book*, which patients can access through an access link that will be provided by the CHAs on their cell phones.

PHASE 2 – CONTENT COMPOSITION

The content of the booklet was composed of subheadings, which were chosen based on the analysis of the semi-structured interview with the patients, as well as on the experience of the researchers. The technological booklet presents guidelines that will be relevant to the patients, as they addressed their doubts and difficulties in controlling the disease, seeking to alleviate them and demonstrate relevant guidelines on diets, medication, physical activity and the importance of medical follow-up.

In order to answer the difficulties that these patients present due to MS, explanatory texts were elaborated with the answers to the most frequent questions. The choice of images was made through coherence with the information mentioned and sought to illustrate the ideas of the texts and explanations, with appropriate colors for the material.

PHASE 3 – CHOICE OF LUSTRATIONS AND LAYOUT OF THE BOOKLET

Choice of illustrations and layout

In order to choose the illustrations that make up the booklet, care was needed to conduct an easy-to-understand reading, consistent with the proposed guidelines and that lead the reader to be curious to engage in learning about the information present in the booklet. The choice of figures was made through images released on electronic pages and the explanation of the researchers to the designer responsible for the elaboration of the booklet.

To prepare the booklet, the layout professional took care to make it easier to read and visually simplify the information provided. Successive attempts were made to establish how the standard was adopted: text in understandable language, regardless of the level of education, and an adequate layout, with good legibility.

PHASE 4 – CONTENT AND APPEARANCE VALIDATION BY JUDGES

For the content validation of the Booklet, evaluators were invited, by means of an invitation letter and a "snowball" strategy, to contribute to the material. The evaluation of the content was carried out by physicians specialized in Endocrinology or Internal Medicine, who are linked to FMS-PI.

Selection of judges

Regarding the number of judges to evaluate the content of the technological booklet, the literature shows controversies regarding the amount needed (Pasquali et al., 2010). However, it is suggested that the number be odd to avoid ties.

The judges were selected through a search of the curriculum by the Lattes Platform. Subsequently, they were invited via *email*. In addition, they were asked about the appointment of other professionals to also participate as judges (snowball strategy). Thus, this work was evaluated by 9 judges.

Assessment of the material by the judges

A period of thirty days was established for each judge to conclude the analysis, fill out the evaluation instrument and send it back to the researchers by e-mail. It should be noted that this research did not pose a biological risk to the judges, but it did present a risk of breaking the confidentiality of the information collected. To minimize these risks, the judges were not identified by name, but by the medical specialty to which they belong, only by numbers. Another possible risk referred to the embarrassment in giving one's opinion in relation to the technological playbook. To minimize these risks, the judges were made clear that their opinion was important for identifying possible flaws and content improvements, and that they would be free not to participate in it whenever they wished, without any prejudice or burden.

The notes included in the questionnaire were read *online* by the researchers by e-mail. The judges were informed about the suggestions that were not clear and confirmed the researcher's interpretation of the answers contained in the questionnaire for the improvement of the material, reducing the inappropriate interpretation of the notes.

After this process, the researchers made the suggested adjustments to the content and illustrations of the technological booklet.

PHASE 5: SEMANTIC VALIDATION WITH PROFESSIONALS

The semantic validation has the function of researching whether all items were coherent for the members of the population to which the instrument referred, and the repetition of the items was

requested by the members of the group. If the repetition left no doubt, the item was correctly understood. On the contrary, if there was a divergence in its reproduction, the subjects suggested how it should be formulated to indicate what the researcher wished to express (Pasquali et al., 2010).

The analysis of the content evaluation carried out by the judges was carried out using the Content Validity Index (CVI), which aimed to measure the agreement or disagreement of the evaluators regarding the items presented in the evaluated instrument, in this case, the booklet. The CVI uses *a Likert* scale, which scores one to four items by item, where 1: not relevant/not representative; 2: needs a major revision to be representative; 3: needs a minor revision to be representative; and 4: relevant or representative (Alexandre et al., 2010).

RESULTS AND DISCUSSION

The present study was based on the creation of an orientation booklet for the follow-up of people with metabolic syndrome. The sample consisted of 22 women, since there were no males in the Basic Health Unit during data collection. A questionnaire was applied divided into two stages, one sociodemographic and the other on clinical data, in order to discover the particularities and impact of the disease on their quality of life. The results obtained are shown in Table 1.

Table 01 - Characterization of the sociodemographic profile of patients diagnosed with metabolic syndrome treated at the Basic Health Unit (BHU). Teresina-PI-2023.N:22.

Age		
18 to 25 years old	2(9,1)	(1,9-26,1)
26 to 35 years old	0(0,0)	-
36 to 45 years old	9(40,9)	(22,5-61,5)
46 years or older	11(50,0)	(30,2-69,8)
City/State of Residence		
Teresina	11(50,0)	(30,2-69,8)
Other cities in Piauí	4(18,2)	(6,5-37,6)
Cities of Maranhão	1(4,5)	(0,5-19,3)
Other Municipalities	6(27,3)	(12,3-47,8)
Income		
Less than one minimum wage	17(77,3)	-
One to two minimum wages	0(0,0)	-
Three to four minimum wages	0(0,0)	-
Greater than five minimum wages	0(0,0)	-
Schooling		
Illiterate	6(27,3)	(13,6-51,7)
Ens. Fund. Complete	2(9,1)	(2,1-28,4)
Ens. Fund. Incomplete	7(31,8)	(17,2-56,8)
Ens. Avg. Complete	1(4,5)	(0,5-21,1)
Ens. Dr. Incomplete	3(13,7)	(4,4-34,9)
Ens. Full Surface	0(0,0)	-
Ens. Incomplete Sup.	1(4,5)	(0,5-21,1)
Marital status		
Married/Common-law relationship	13(59,1)	(40,7-80,1)
Single	0(0,0)	-
Separated/Divorced	2(9,1)	(2,0-27,2)
Widow	6(27,3)	(12,9-49,7)
Color/Race		

White	6(27,3)	(14,4-53,9)
Curtain	7(31,8)	(18,2-59,1)
Black	5(22,7)	(10,8-48,4)
Yellow	0(0,0)	-
Indigenous	1(4,6)	(0,6-22,1)

Source: Author (2024)
95% CI: Confidence interval for ratio.
CI-5%: Confidence interval for mean.

The results showed that the profile of the volunteers was: 50% are over 45 years old, 50% are residents of the municipality of Teresina, 77.3% of them earn less than one minimum wage, 31.8% have incomplete elementary education and 27.3% are illiterate, 59.1% are married, in addition to 31.8% considering themselves brown and 27.3% white. It is noteworthy that 5 women did not answer about their income level, 2 about their level of education, 1 about their marital status and 3 about their color/race, it was observed that they did not feel comfortable answering these questions, because they remained silent. Table 2 shows the characteristics of the clinical profile of patients diagnosed with metabolic syndrome treated by the Basic Health Units.

Table 02 - Characterization of the clinical profile of patients diagnosed with metabolic syndrome treated by the Basic Health Unit (BHU). Teresina-PI-2023.N:22.

	Clinical Data			
	N(%)	IC-95%	Mean (95% CI)	Dp
How Long Do You Live With The Diagnosis Of Metabolic Syndrome				
1 to 3 years	7(31,8)	(17,2-56,8)		
2 to 6 years	6(27,3)	(13,6-51,7)		
7 to 10 years	2(9,1)	(2,1-28,4)		
More than 10 years	5(22,7)	(10,2-46,4)		
Lifestyle Habits (Frequency of Physical Activity) How Many Times a Week				
1	1(4,6)	(2,3-62,9)		
2	1(4,6)	(2,3-62,9)		
5	3(13,6)	(20,9-90,6)		
Lifestyle Habits (Frequency of Physical Activity) minutes			- 36.00(24.89-47.11) 8.94	
Do you know what metabolic syndrome is?				
Yes	1(4,6)	(0,5-20,2)		
No	20(90,9)	(79,8-99,5)		
Do you know the complications of this pathology?				
Yes	8(36,4)	(18,9-57,1)		
No	14(63,6)	(42,9-81,1)		

Source: Author (2024)
95% CI: Confidence interval for ratio.
CI-5%: Confidence interval for mean

Regarding the clinical profile of MS patients, it is important to point out that not all interviewees answered all the questions, since in some points they did not know what to say and others did not feel comfortable, for example, 2 did not say how long they have been living with the diagnosis of metabolic syndrome, 17 did not say how many times a week they do physical activities and 1 does not know what metabolic syndrome is. Therefore, in the table above, some items do not have a total of 22 answers. Thus, 31.8% have more than 3 years with the pathology; only 22.8% do

little or no physical activity weekly; 63.6% of women, despite having this disease, do not know what it really is, or even the main complications arising from it.

The characterization of the health profile of patients diagnosed with MS, with regard to difficulties in controlling the disease, diet and medications, is presented in Table 03.

Table 03 - Characterization of the health profile of patients diagnosed with metabolic syndrome attended at the Basic Health Unit (BHU). Teresina-PI-2023.N:22.

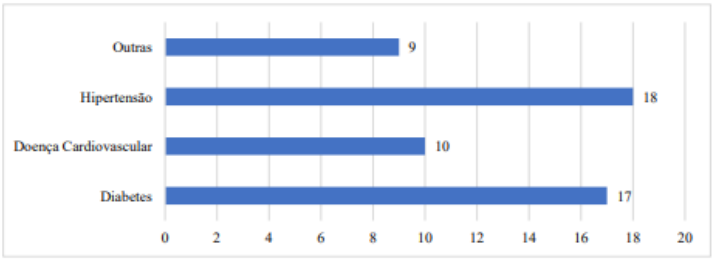
	Sim	Não
	N(%)	N(%)
Quais suas dificuldades no controle da síndrome metabólica?		
Fazer uso de medicação diariamente	0(0,0)	22(100,0%)
Seguir a dieta recomendada	17(77,3%)	5(22,7%)
Praticar exercícios físicos	17(77,3%)	5(22,7%)
Ir com regularidade para as consultas médicas	3(13,6%)	19(86,4%)
Quais dificuldades em manter a sua alimentação de forma saudável?		
Desconhece a dieta	11(50,0%)	11 (50,0%)
Não gosta das restrições alimentares que a dieta resulta	5 (22,7%)	17 (77,3%)
Recebeu pouca ou nenhuma orientação a respeito da dieta pela equipe de saúde	16 (72,7%)	6 (27,3%)
Quais medicações você utiliza?		
Anti-hipertensivas	20 (90,9%)	2 (9,1%)
Anti-glicemiantes Orais ou injetáveis	20 (90,9%)	2 (9,1%)
Outras	6 (27,3%)	16 (72,7%)

Source: Author (2024)

In the characterization of the health profile of patients diagnosed with MS, it was identified that 77.3% of the participants reported difficulty in practicing physical exercises and correctly following the recommended diet. In addition, 72.7% did not receive any dietary guidance, and 100% did not use frequent medications, although 90.9% used antihypertensive drugs, oral or injectable antiglycemic agents.

The previous pathologies of these patients were also investigated, which could mark more than one response, however, the ones that stood out were hypertension reported by 81.8% of the volunteers and diabetes by 1. However, other diseases were also mentioned, which are present in Graph 01 .

Graph 01 - Characterization of previous diseases of patients diagnosed with metabolic syndrome attended at the Basic Health Unit (BHU). Teresina-PI-2023.N:22.



Source: Author (2024).

Another important point investigated was the characteristics related to the lifestyle habits of MS patients, such as physical activity (5 patients), smoking (6 patients) and alcohol consumption (3 patients).

Regarding the characterization of the lifestyle habits of these participants, as previously mentioned, they did not answer all the questions, some did not feel comfortable answering, so only 63.6% of the 22 answered the questions presented above, of which 27.3% of the participants were smokers and another 13.6% alcoholics. After the analysis of the results, it was possible to elaborate the Technological Booklet, which was the focus of the results of this study.

Figure 1: Cover of the Educational Technology Booklet

Figure 2: Contra Layer

Figure 3: Table of Contents

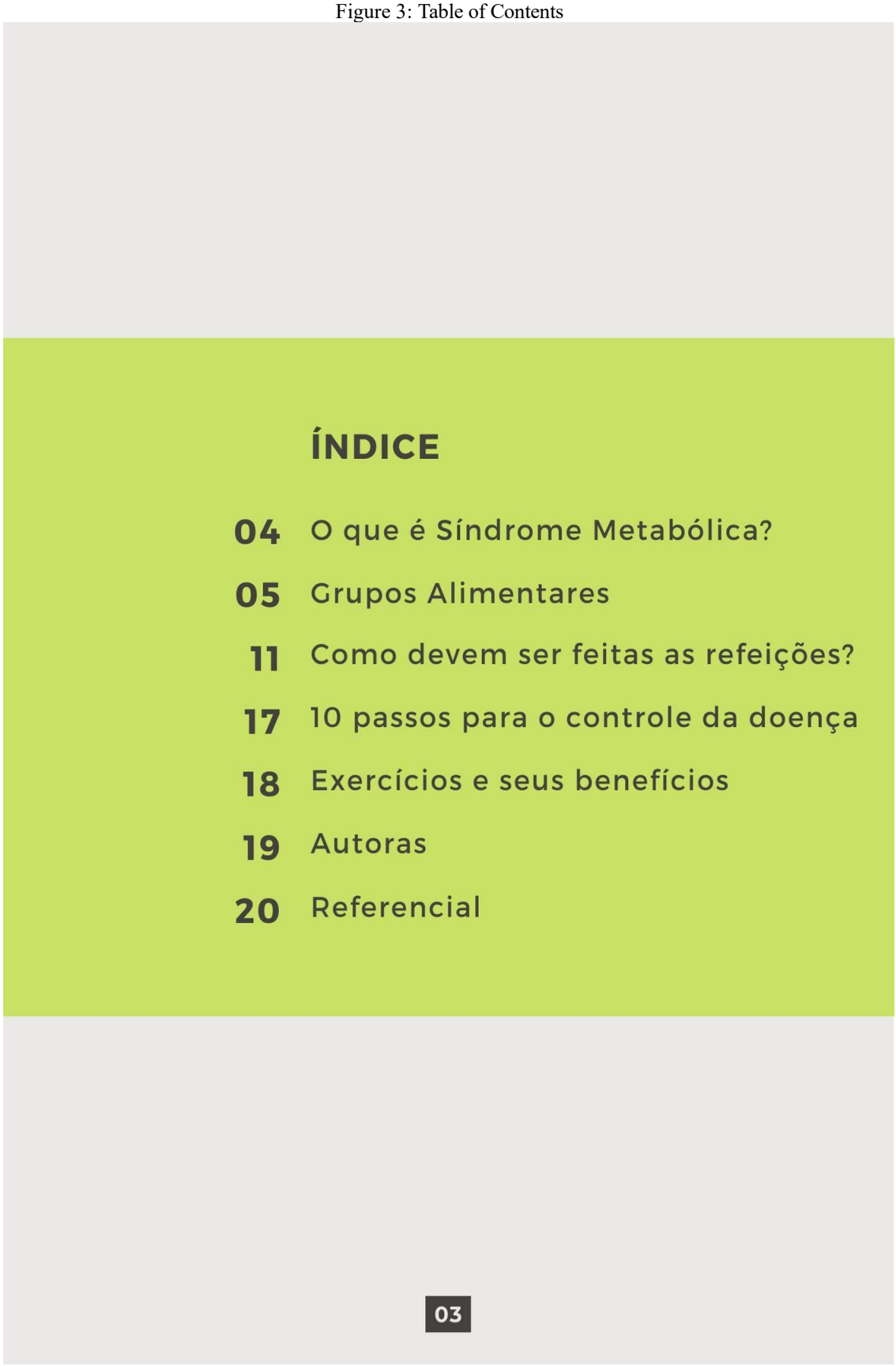


Figure 4: What is metabolic syndrome

O que é a Síndrome Metabólica?

1. A síndrome metabólica é uma desordem relacionada, principalmente, com o acúmulo de gordura abdominal e as alterações da glicose com ou sem resistência à insulina.
2. A Síndrome metabólica contribui diretamente para o desenvolvimento de doença cardiovascular e para o aparecimento do Diabetes Mellitus tipo 2, além disso, ela aumenta o risco de morte prematura, doença renal, doença mental e de câncer.

Como evitar?

Alimentação saudável	Controle da pressão arterial	Controle glicêmico
Níveis de colesterol e triglicerídeos saudáveis		Estilo de vida ativo
	Atividades físicas	

04

Figure 5: Food groups

Figure 6: Alimentos in nature

Figure 7: Minimally processed foods

2. Minimamente processados

São aqueles alimentos que passaram por modificações pequenas, como refrigeração, congelamento, limpeza, secagem ou pasteurização.

07

Figure 8: Oils and Fats

3. Óleos e Gorduras

São compostos por produtos extraídos da natureza ricos em ésteres de triacilgliceróis e produtos resultantes da esterificação entre o glicerol e ácidos graxos.
A diferença entre óleos e gorduras é que os óleos são, em sua maioria de origem vegetal e líquidos à temperatura ambiente. Já as gorduras, são sólidas e podem ser de origem vegetal ou animal.

08

Figure 9: Processed foods

4. Alimentos Processados

São aqueles produtos produzidos em indústrias, que são acrescentados sal, açúcar e outras substâncias para aumentar a validade e deixar o sabor mais agradável.

09

Figure 10: Ultra-processed foods

Figure 11: How meals should be eaten

Figure 12: How meals should be eaten

Figure 13: How meals should be eaten

Figure 14: How meals should be eaten

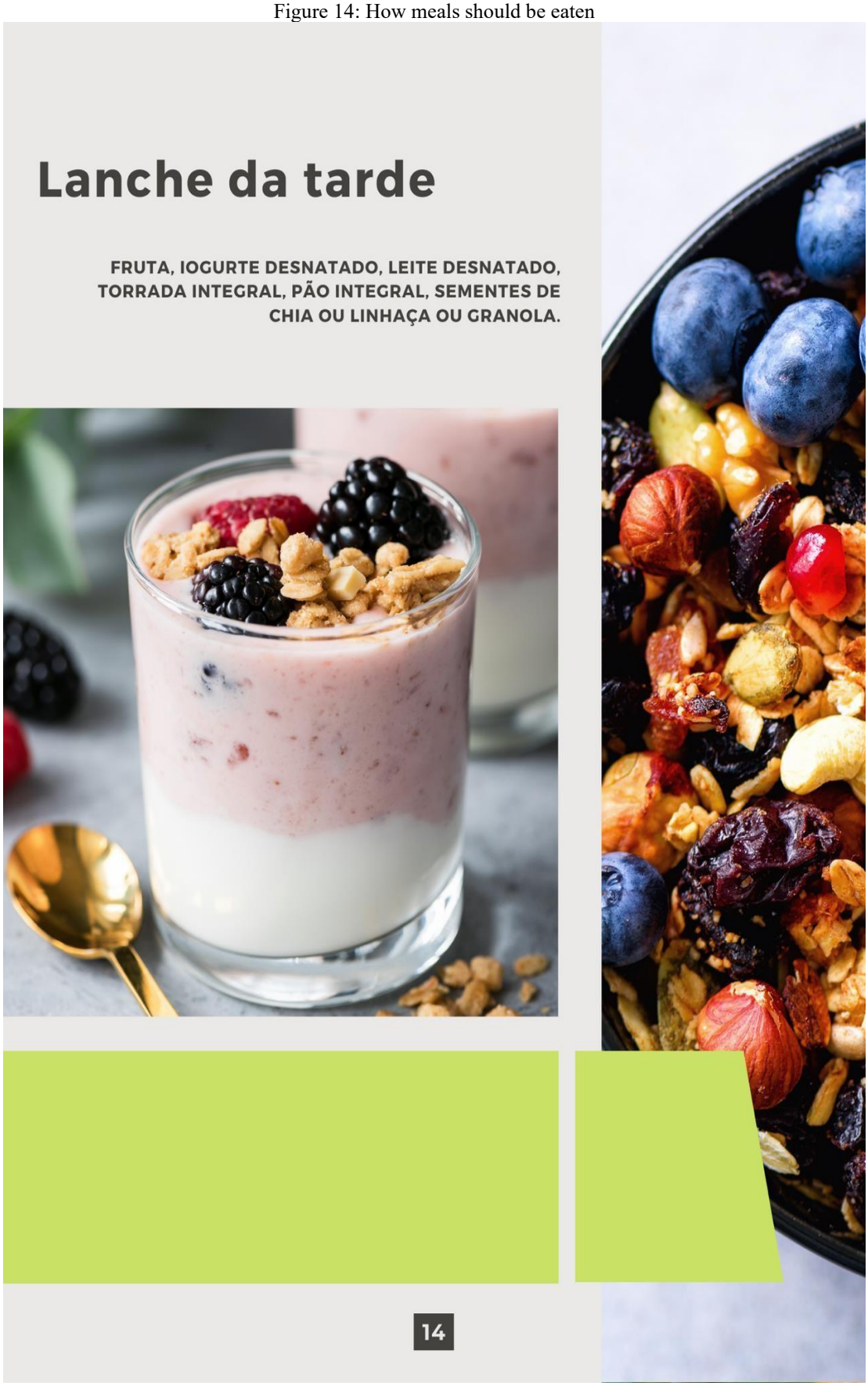


Figure 15: How meals should be eaten

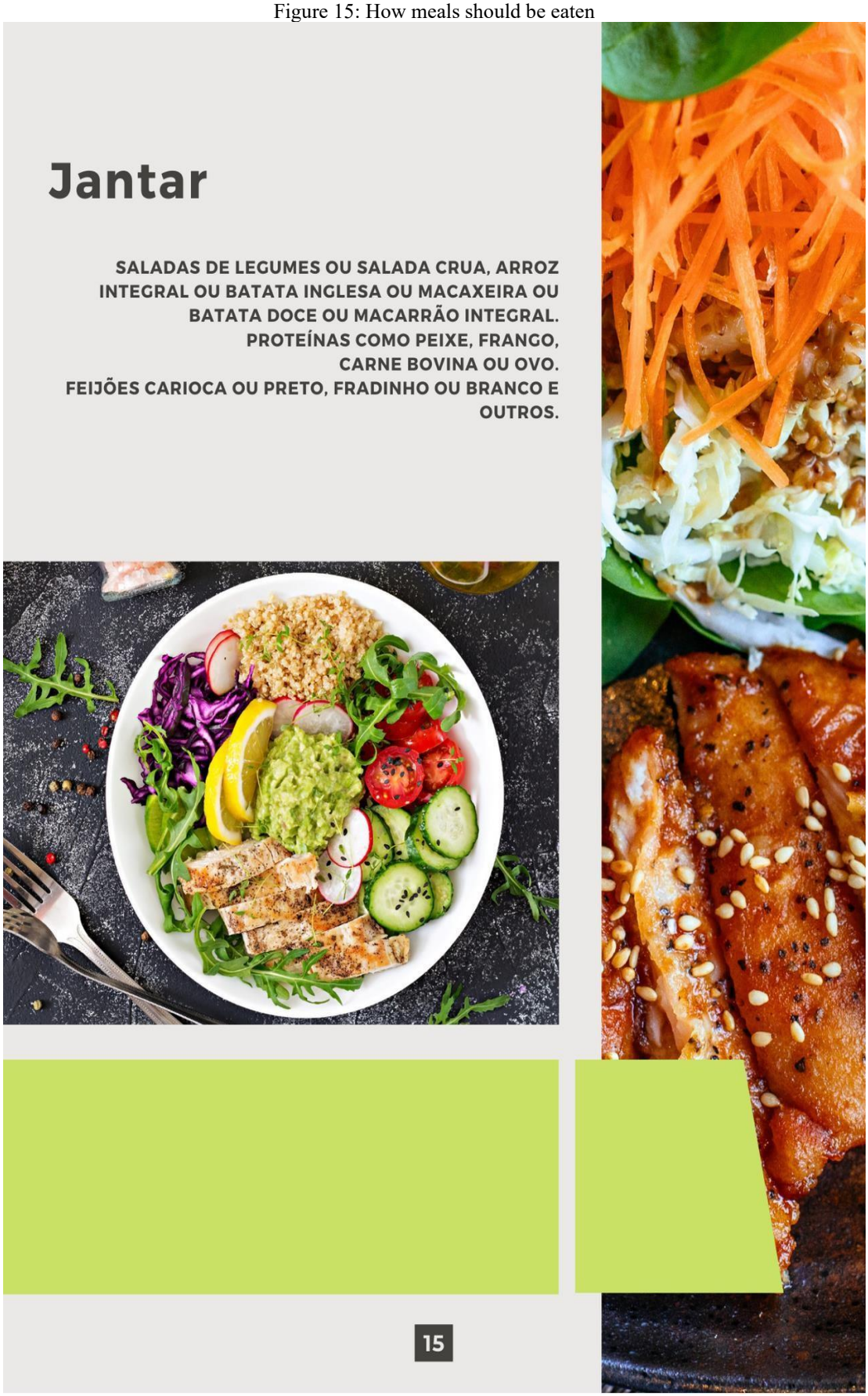


Figure 16: How meals should be eaten

Figure 17: 10 steps to manage metabolic syndrome

10 passos para o controle da doença

1- Consuma pelo menos 3 tipos de frutas por dia;
2- Faça uma boa ingestão de água. Para saber a sua quantidade de água ideal para o seu peso é só calcular: Peso (kg) x 35.
Exemplo: 70 x 35 = 2.450 -> 2 litros e 450 ml;
3- Consuma alimentos in natura;
4 - Evite alimentos processados e ultraprocessados;
5 - Faça exercício físico diariamente;
6 - Reduza a quantidade de açúcar, sal e gorduras saturadas;
7- Consuma sementes de chia, linhaça, assim como castanha, amendoim;
8- Consuma ovos, carnes magras e prefira carnes brancas, como: frango e peixe. Consumir carne vermelha, preferencialmente, uma vez na semana;
9- Não esqueça dos medicamentos prescritos pelo seu médico;
10- Não consuma bebidas alcoólicas.

17

Figure 18: Benefits of exercise

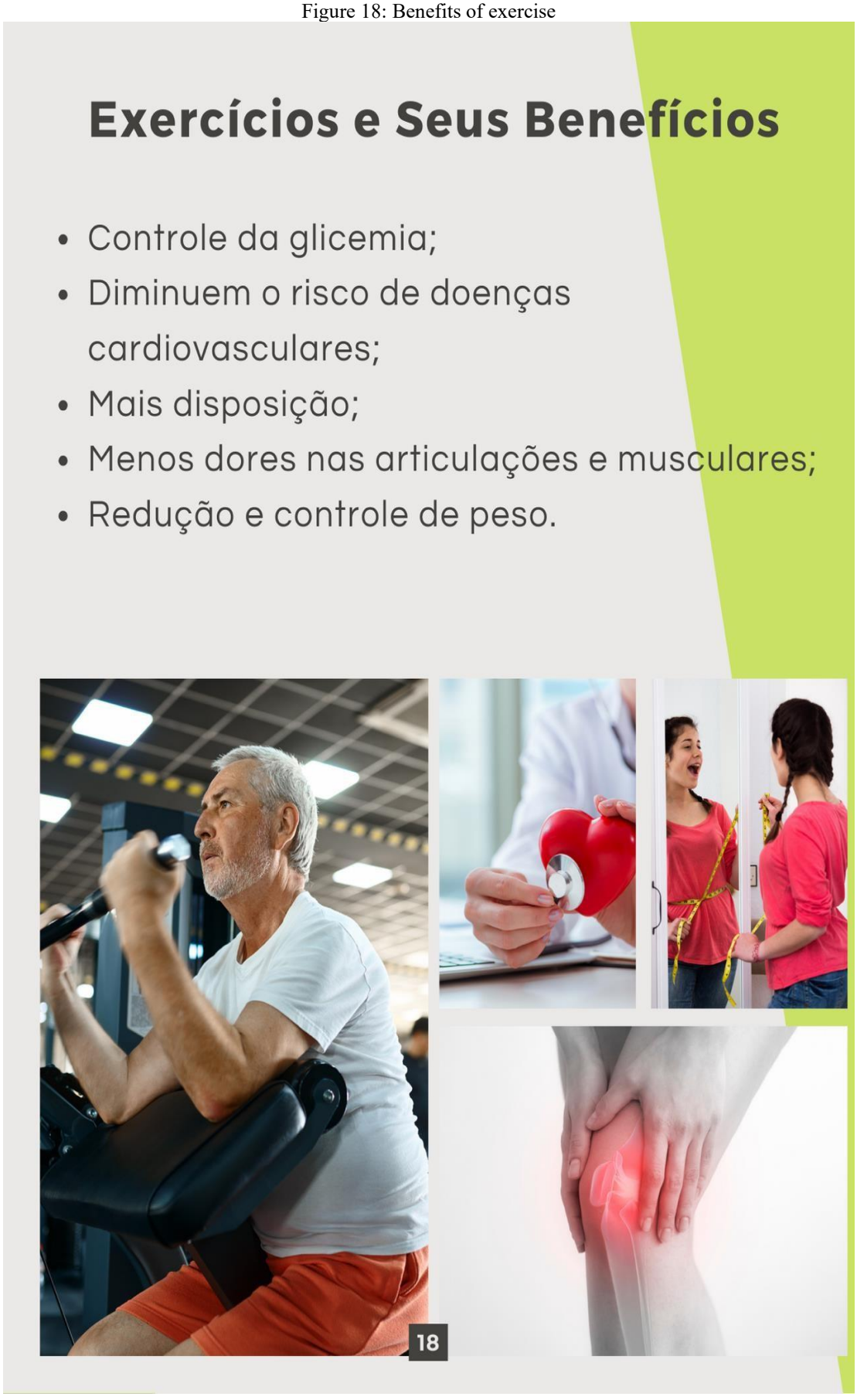


Figure 19: Female authors

Figure 20: Reference

Referencial

1- Canva. [Internet]. Figuras e edição. Disponível em: https:www.canva.com. Acessado em 22 de março de 2023. Canva, 2023.

2- CORTEZ, R. M. A. et al. Conhecimento de estudantes sobre síndrome metabólica após intervenção educativa. Rev. Bras. Enferm. Brasília, v. 71, supl. 4, p. 12-20, set. 2018.

3- SBCM. Curso de atualização. 2023. Disponível em: https://www.sbcm.org.br/v2/index.php/not%C3%ADcias/697-sp-1139881015.
Acesso em: 12 mai. 2023.

Figure 21: *QR code* for access to the booklet

In the present study, the volunteers were only female, but there is a greater predominance of women. As reported by the National Health Survey (PNS), conducted by PeSecond in 2013, the prevalence of MS in Brazil was 8.9%, with a statistically higher percentage in females (10.3%) than in males (7.5%), and was associated with low schooling, stroke, and other cardiovascular diseases (Oliveira, et al., 2020), presenting a result similar to the present study, due to its prevalence in women.

Of the volunteers, 18 had the following diseases: diabetes, hypertension and cardiovascular

diseases, and 16 reported problems in maintaining a healthy diet and practicing physical exercise. According to (Mussi et al., 2019), they state that cardiovascular diseases and DM are the main causes of death worldwide, and the prevention and control of these diseases is of great importance. When they are combined, as is the case with metabolic syndrome, the situation worsens and the need for follow-up and care is even greater, corroborating the findings of this study, in which the pathologies that stood out the most were diabetes and hypertension.

Regarding diet and physical activity, the authors (Silva, et al., 2021), in their research on MS, obtained evidence of the value of regular physical exercise and changes in eating patterns. These actions play a crucial role in decreasing abdominal circumference, reducing visceral fat, and as a result, enhancing insulin sensitivity. Reflecting in the reduction in plasma glucose levels, contributing to the prevention of type 2 diabetes.

Regarding physical activities, it was found that 63% of the women did not exercise during the study, however, 27.27% smoked and 13.63% were alcoholics. Another fact is that less than 25% of the interviewees do some physical practice, such as walking or running. According to this information (Monte et al., 2020), it is explained that criteria such as physical activity are relevant for the creation of health awareness and education programs, and for the development of activities that help women adopt healthier habits.

Another worrying point found in the results of the present study is that 81.81% of these women do not know what MS is. The study by Oliveira et al., 2020 agrees with this information, in which he emphasizes that because it is a silent disease, many individuals do not know that they have such a pathology, and when they discover it, they do not seek information about the consequences of this syndrome, data that diverge with the data of the study in question, Because the volunteers have the diagnosis, but they don't know what it is, even if they treat it.

According to the volunteers, they are not able to follow the diet given by the doctors, but they have no problem going to the doctor's appointment. However, when questioned about the complications arising from this pathology, 14 of the 22 women argued that they do not have knowledge about these complexities. However, the analysis points to an apparent contradiction, because although they are aware of the existence of MS, they do not seem to understand the significant risks associated with this condition. This disconnect between the knowledge about having the diagnosis of MS and the lack of understanding about the inherent risks becomes a point of attention for this patient profile.

Thus, it is noticeable that the follow-up of patients with metabolic syndrome has the potential to significantly improve the quality of life of these people. Therefore, the research conducted by (Monte et al., 2019), emphasizes that, with good guidance, there is a reduction in the occurrence of complications and an increase in well-being for individuals. However, this requires the collaboration

of health professionals, patients and their families, and the creation of public policies capable of promoting the prevention and control of these pathologies.

Regarding the medications that the volunteers in this study consume the most, antihypertensive drugs and oral or injectable antiglycemic agents stood out (about 87% of the interviewees), and 70% of them do not know what the complications of MS are. Thus, similar results were found in the study by (Albuquerque, et al., 2023) that aimed to evaluate the drug interactions present in the medical prescriptions of patients at the Tasso Jereissat Polyclinic. The results showed that of the 22 patients interviewed, 40.9% (9) were aged between 60 and 74 years, 54.55% (12) were younger than 59 years and 4.55% (1) were over 75 years old, and all individuals were using antihypertensive and hypoglycemic drugs.

Considering all the limitations and difficulties, the creation of educational tools for people with metabolic syndrome is an important strategy in an attempt to help people understand and cope with MS, with a focus on improving health and well-being. Some of the advantages of developing educational tools for people with metabolic syndrome include: Improved knowledge; Increased awareness; Access to information and adherence to treatment. However, it is important to remember that educational tools are only a complementary way to help cope with the syndrome, and cannot be used to replace conventional medical treatment.

The educational materials in the various health approaches show effectiveness, and with regard to the technological booklet of the present study, it consists of 18 pages, with content related to the concept of MS, its causes, main symptoms, diagnostic methods, treatment options and the types of foods recommended, such as those rich in fiber, omegas 3 and 6, among others. The booklet also addresses prevention strategies, highlighting the importance of a healthy diet and physical activity. The material is richly illustrated in order to facilitate understanding, as well as to favor the dissemination of essential information for the well-being of people affected by MS. In order for the population to have access to this booklet, it will be made available through a sponsored access link, social media, email marketing, WhatsApp groups, in addition to submitting the product in digital magazines, website and digital platforms of the municipal health foundation.

CONCLUSION

The findings of the study showed that most women with Metabolic Syndrome (MS) have diabetes, hypertension and cardiovascular diseases, which requires close monitoring, especially in relation to diet and physical exercise, often made difficult by late diagnosis. Most of them were over 45 years old, living in Teresina-Pi, earning less than one minimum wage, having incomplete high school education or are illiterate, married, and consider themselves brown or white. The data collected enabled the construction of the technological primer on MS, validated by expert judges.

It is hoped that the findings and the construction of the didactic and educational material will benefit the population, to understand and conduct the changes pertinent to MS, in addition to instigating the creation of public policies that meet the needs of this patient profile, including the promotion of health education and the maintenance of accessible health services. It is available in this publication, in digital format through the access link (Figure 21).

REFERENCES

1. AGUILAR, M. (2015). Prevalence of the metabolic syndrome in the United States, 2003-2012. JAMA, 313(19), 1973-4.

2. American Diabetes Association. (2021). Standards of Medical Care in Diabetes. Diabetes Care, 44(Suppl. 1), S125-S150.

3. ALVES NR, DE MENEZES PDL, DINIZ JA, DE SOUZA FAF, CARVALHO PMMC, CASTELLAO TAVARE SMQ. (2019). Avaliação das interações medicamentosas entre antihipertensivos e hipoglicemiantes orais. Id on Line Rev. Mult. Psic., 13(44), 374-392.

4. ALEXANDRE, N. M. C.; COLUCI, M. Z. O. (2011). Validade de conteúdo nos processos de construção e adaptação de instrumento de medidas. Ciência e Saúde Coletiva, 7(16), 3061-3068.

5. AMARANTE, C. N.; JUNIOR, J. B. (2021). Aplicativo "web-mobile", derivado de métodos de inteligência artificial, para predição de deficiência de testosterona em homens. XXV SEMINÁRIO DE INICIAÇÃO CIENTÍFICA DA UEFS SEMANA NACIONAL DE CIÊNCIA E TECNOLOGIA.

6. BARBOSA, M. C. et al. (2016). Associação entre ácido úrico e variáveis de risco cardiovascular em uma população não hospitalar. Arq Bras Cardiol., 96(3), 212-8.

7. CANVA. CANVA. Disponível em: https://www.canva.com.

8. CIBIČKOVÁ, L. et al. (2017). Correlation of uric acid levels and parameters of metabolic syndrome. Physiological research, 66(3), 481.

9. CORTEZ, R. M. A. et al. (2018). Conhecimento de estudantes sobre síndrome metabólica após intervenção educativa. Rev. Bras. Enferm., 71(Supl. 4), 12-20.

10. DA COSTA, P.; DE SOUZA, A.; SANCHES, F. (2020). Prevalência de síndrome metabólica e perfil nutricional de pacientes obesos cardiopatas hospitalizados. FAG JOURNAL OF HEALTH (FJH), 2(2), 259-272.

11. ESTADÃO. (2020, dezembro 2). A Endocrinologia em tempos de Inteligência Artificial e COVID-19.

12. IVANOVA, E. A. et al. (2017). Small Dense Low-Density Lipoprotein as Biomarker for Atherosclerotic Diseases. Oxid Med Cell Longev., 12(13), 123-31.

13. LEE, J. J. et al. (2016). Association of changes in abdominal fat quantity and quality with incident cardiovascular disease risk factors. J Am Coll Cardiol., 68(14), 1509-1521.

14. LIRA NETO, J. C. G. et al. (2017). Prevalência da Síndrome Metabólica em pessoas com Diabetes Mellitus tipo 2. Rev Bras Enferm., 70(2), 265-270.

15. MONTE, I. P. do. et al. (2019). Comparação entre quatro diferentes critérios de diagnóstico de síndrome metabólica em indivíduos do Arquipélago do Marajó (Pará, Brasil). Revista da Associação Brasileira de Nutrição - RASBRAN, 10(1), 96–102.

16. MUSSI, R. F. DE F.; PETRÓSKI, E. L. (2019). Síndrome metabólica e fatores associados em quilombolas baianos, Brasil. Ciência & Saúde Coletiva, 24(7), 2481–2490.

17. NEVES, C. V. B. et al. (2019). Associação entre síndrome metabólica e marcadores inflamatórios em idosos residentes na comunidade. Cad. Saúde Pública, 35(3), 1-23.

18. NUNES ALBUQUERQUE NL, DA SILVA ME, ROCHA CAVALCANTE A, PERRELLI RANDAU K, DE MORAIS BELO BEZERRA ML. (2022). Tecnologias Educacionais Digitais para abordagem da Sifilis e instrumentalização de profissionais de saúde. Div Journ, 7(1), 0313-28.

19. OLIVEIRA, L. V. A. et al. (2020). Prevalência da Síndrome Metabólica e seus componentes na população adulta brasileira. Ciência & Saúde Coletiva, 25(11), 4269– 4280.

20. OLIVEIRA S. A. L. et al. (2017). Avaliação de fatores de risco para dislipidemia em pacientes diabéticos tipo 1. Revista Saúde & Ciência Online, 6(1), 33-48.

21. PEREIRA, A.S. (2018). Metodologia da pesquisa científica. Santa Maria, RS: UFSM.

22. RAMIRES, E. K. N. M. et al. (2018). Prevalência e Fatores Associados com a Síndrome Metabólica na População Adulta Brasileira: Pesquisa Nacional de Saúde – 2013. Arq. Bras. Cardiol, 110(5), 23-30.

23. REBERTE, L. M.; HOGA, L. A. K.; GOMES, A. L. Z. (2017). O processo de construção de material educativo para a promoção da saúde da gestante. Revista Latino-Americana de Enfermagem, 20(1).

24. ROCHA, F. L.; MELO, R. L. P. MENEZES, T. N. (2016). Fatores associados à síndrome metabólica em idosos do nordeste do Brasil. Rev. bras. geriatr. gerontol, 19(6), 11-8.

25. ROSA, V. D. et al. (2015). Nível de ácido úrico como biomarcador diagnóstico e prognóstico de doenças cardiovasculares. Ciências Biológicas e da Saúde, 36.

26. SABOYA, P. P. et al. (2016). Metabolic syndrome and quality of life: a systematic review. Rev. Latino-Am. Enfermagem, 24(12), 1-8.

27. SBCM. (2023). Curso de atualização. Disponível em: https://www.sbcm.org.br/v2/index.php/not%C3%ADcias/697-sp-1139881015. Acesso em: 12 mai. 2023.

28. SILVA, B. N. et al. (2018). Análise do ácido úrico como exame diagnóstico de importância clínica. Mostra Científica em Biomedicina, 3(1).

29. SILVA, H. A.B. et al. (2015). Relação entre ácido úrico e síndrome metabólica em uma população com risco cardiometabólico. Einstein, 13(2).

30. SZWARCWALD, C. L. et al. (2016). National Health Survey in Brazil: design and methodology of application. Cien Saude Colet, 19(2), 333-42.

31. WORLD HEALTH ORGANIZATION. (2020). Obesity: preventing and managing the global epidemic. Genebra: World Health Organization.

32. VINUTO, J. (2014). A amostragem em bola de neve na pesquisa qualitativa: um debate em aberto. Temáticas, 22(44), 203-20.

33. YAMAMOTO, H. H.; ARAUJO, J. M.; LIMA, S. Mª. R. R. (2018). Síndrome metabólica na após a menopausa: prevalência da hipertensão arterial em mulheres com sobrepeso e obesidade. Arquivos Médicos dos Hospitais e da Faculdade de Ciências Médicas da Santa Casa de São Paulo, 62(1), 1-6.