

# Use of educational technologies in monitoring patients with metabolic syndrome

Uso de tecnologías educacionais baseadas na andragogia para educação de enfermeiros nefrologistas

Uso de tecnologías educativas no apoyadas por pacientes con síndrome metabólico

## RESUMO

Objetivo: analisar na literatura o uso de tecnologias educativas em pacientes com síndrome metabólica. Métodos: uma revisão integrativa, a seleção dos artigos foi realizada nas bases de dados do SciELO, PUBMED e LILACS entre os anos de 2015 à 2020. Encontrados 186 artigos e 09 foram selecionados. Resultados: o uso de Tecnologias educativas em pacientes com Síndrome Metabólica obteve vantagens, tanto no seguimento da população adulta e idosa. Os recursos de Tecnologias Educativas utilizados foram: treinamento de exercícios por telemonitoramento, Programa de controle de peso por aplicativo, cartilha, exergame, e programa de educação nutricional. Conclusão: o uso de Tecnologias Educativas reduz o risco de complicações ocasionadas pela Síndrome metabólica, atinge a melhora da saúde mental, da capacidade para desempenho laboral e impacto positivo no estilo de vida.

**DESCRIPTORIOS:** Síndrome Metabólica;Tecnologias;Saúde.

## ABSTRACT

Objective: to analyze in the literature the use of educational technologies in patients with metabolic syndrome. Methods: an integrative review, the selection of articles was carried out in the SciELO, PUBMED and LILACS databases from 2015 to 2020. 186 articles were found and 09 were selected. Results: the use of educational technologies in patients with Metabolic Syndrome had advantages, both in the follow-up of the adult and elderly population. Educational Technology resources used were: exercise training by telemonitoring, Weight control program by application, booklet, exergame, and nutritional education program Conclusion: the use of Educational Technologies reduces the risk of complications caused by metabolic syndrome, achieves improvement in mental health, ability to perform work and positive impact on style of life.

**DESCRIPTORS:** Metabolic Syndrome;Technologies;Health.

## RESUMEN

Objetivo: analizar en la literatura el uso de tecnologías educativas en pacientes con síndrome metabólico. Métodos: revisión integradora, selección de artículos realizado en las bases de datos SciELO, PUBMED y LILACS de 2015 a 2020. Se encontraron 186 artículos y se seleccionaron 09. Resultados: el uso de tecnologías educativas en pacientes con Síndrome Metabólico presentó ventajas, tanto en el seguimiento del adulto como del anciano. Los recursos de Tecnología Educativa utilizados fueron: entrenamiento de ejercicios por telemonitorización, programa de control de peso por aplicación, cuadernillo, exergame y programa de educación nutricional. Conclusión: el uso de Tecnologías Educativas reduce el riesgo de complicaciones causadas por el síndrome metabólico, logra mejorar la salud mental, capacidad para realizar el trabajo e impacto positivo en el estilo de vida.

**DESCRIPTORES:** Síndrome Metabólico;Tecnologías;Salud.

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## INTRODUCTION

**M**etabolic syndrome (MS) is a multifactorial disorder mainly related to the deposition of abdominal fat and changes in glucose homeostasis and/or insulin resistance. This syndrome can cause some dysfunctions in the individual's metabolism, such as: hyperglycemia, visceral obesity, dyslipidemia, hypertension, pro-inflammatory and prothrombotic state. 1

MS directly contributes to the development of cardiovascular disease (CVD) and the onset of type 2 Diabetes Mellitus (DM2), in addition, it increases the risk of premature death, kidney disease, mental illness and cancer. 2-3

The prevalence of MS shows a progressive increase over time, especially in populations living in low- and middle-income countries and among the elderly. 4 The prevalence in the world population is 25%, accounting for 7% of global mortality and 17% of deaths related to CVD, varying according to age, sex, ethnicity, the diagnostic criteria used and the group evaluated. 1,5

The literature also emphasizes that people with MS 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 DM2. 2,6

For its diagnosis, it is necessary to follow some criteria established by the National Cholesterol Education Program's Adult Treatment Panel III (NCEP-ATPIII) and recommended by the I Brazilian Guideline for the Diagnosis and Treatment of Metabolic Syndrome (I-DBSM, 2018).

There is also the presence of at least three metabolic risk factors for the inclusion of its diagnosis, such as obesity, high cholesterol and fasting glucose levels, and increased blood pressure. 18

Additionally, treatment with the use of drugs to control lipids, blood glucose and blood pressure was also considered. 7

Considering the complexity of MS and its long-term consequences, interventions to prevent its predisposing factors are necessary. In this way, the use of educational technologies (ET) is one of the indicated strategies, which is understood as a process, a thought, an emancipatory pedagogical activity that promotes the autonomy of the subjects. 8-9

Considering the importance of the use of educational technologies, the study aims to analyze in the literature the advantages of using these technologies in the follow-up of patients with this disease.

## METHODS

It was an integrative review study research. Searches for research were carried out from March 2021 to April 2021 in the database of Latin American and Caribbean Literature on Health Sciences (LILACS); Medical Literature Analysis and Retrieval System Online (MEDLINE), from the Scientific Electronic Library Online (SciELO) and PUBMED, by combining the following descriptors: "Metabolic Syndrome (Síndrome Metabólica)"; "Technologies (Tecnologias)"; "Health (Saúde)" (according to Descriptors in Science and Health-DeCS). This combination was used with the Boolean connectives "and" or "or".

For inclusion of studies, primary research, experience reports, randomized research and clinical trials published in the period 2015 to 2020, in Portuguese and English, were selected, which portrayed the advantages of using ET in the treatment and prevention of MS. Duplicate articles, review research, and those whose objective was outside the context of this study were excluded.

For data analysis, the search and selection of research that made up the study was performed in the following combination in the aforementioned databases: "Síndrome Metabólica" and "Tecnologias" and "Saúde", which enabled the identification of 186 articles (LILACS=05; MEDLINE=14; SCIELO=2; PUBMED=165). After reading and interpreting these researches, 09 articles were selected that met the inclusion criteria and the proposed objectives, being 2 articles from LILACS; 1 from SciELO and 6 from PUBMED.

## RESULTS

The results of this research were built through the analysis and interpretation of 9 articles, most of them identified in the year 2020 and in English, with 8 articles. Randomized and interventional research also stood out.

Table 1 shows the authorship, year of publication, educational technology used, target audience and advantages of using ET.

## DISCUSSION

Studies agree that social media through apps represent an invaluable resource for healthcare professionals, as a low-maintenance vehicle to communicate with patients, as well as a source of social support and information sharing for individuals with MS undergoing lifestyle modification. 10-12

Two researches of the randomized clinical trial type showed in their results that the Internet-based lifestyle intervention, through social media methods, improved body weight, BMI, waist circumference (WC), fat mass, lean mass and energy intake in patients with MS. 10-11

Only one of the selected studies showed the use of ET in the elderly population, 13

It was possible to identify that there are few studies in this segment, which can be explained by the difficulties of access of the elderly population to ET being more difficult.

In a study carried out in Teresina-PI, the technological resource developed was a booklet, whose target audience were ado-

lescents accompanied by primary care with or without the diagnosis of MS, and the validation of the constructed material was performed by 21 specialists and 39 adolescents and at the end of this process it was possible to identify that it is a valid and reliable instrument to be used in order to promote the health of adolescents with MS. 13

With a different approach, an experimental intervention was used as an educational resource the exergame to encourage the practice of physical activity in this public, and found a reduction in cases of MS in the post-intervention period with aerobic exercise with the aid of exergame, however, the impact was not considered

Table 1: Educational technologies and results for the public.

AUTHOR/ YEAR	EDUCATIONAL TECHNOLOGY USED	PUBLIC	RESULTS
Lee, Kang e Lee (2020)	Programa e-Motivate 4 Change	Young adults	The program can be used to identify and prevent MS among young adults.
Pimentel et al. (2020)	Exergame	Adolescents	A reduction of MS cases in the post-intervention period with aerobic exercise with the aid of exergame, however, the impact was not considered statistically significant
Seo et al. (2020)	Persuasive ICT advice (app)	Adults and seniors (20 to 60 years)	Reduce the prevalence of MS.
Thuita et al. (2020)	Nutrition education program with peer support	Young adults	Improved metabolic outcomes and reduced MS in T2DM patients.
Haufe et al. (2019)	Exercise training supported by telemonitoring	Trabalhadores de uma empresa	Significant potential to reduce the risk of disease while improving mental health.
Jahangiry, Montazeri e Jahangiry (2017)	Weight management program offered by social media (app)	Young adults	They indicate the positive impact on physical activity, food intake and several dimensions of QOL.
Jane et al. (2017)	Weight management program offered by social media (app)+booklet	Young adults	Modifications in diet and physical activity for weight control.
Moura et al. (2017)	Cartilha educativa	Adolescents	It proved to be a valid and reliable instrument to be used in order to promote the health of adolescents with MS

Source: researchers, 2021.

Caption: CHANGE: Canadian Health Advanced Program by Nutrition and Graded Exercise; CVD= Cardiovascular Diseases; QL= Quality of Life; ICT= Information and Communication Technology.

statistically significant. 14

Corroborating the previous study, regular physical activity supported by telemonitoring on MS severity and work ability was tested on 543 employees at Volkswagen's main factory in Wolfsburg-Germany, it was possible to verify that this telemonitoring system reduced the severity of MS. It was possible to verify the reduction of metabolic risks and the improvement of the mental health of these employees. 15

In Daegu-Korea, a Motivate 4 Change program was developed in a program for the prevention and management of MS in young adults, presenting being easily accessible by cell phone, it proved to be effective in changing the health-related lifestyle and the effectiveness of the participants, and significantly reduced their BMI and cholesterol levels. The program can be used to identify and prevent MS among young adults. 16

In a randomized clinical trial with two intervention groups and a control, with 51 participants in each group, where the intervention group involved a nutritional education program with peer support; the other involved only the education program, conducted for 2 hours a week for 8 weeks. It was possible to verify that nutritional education with the inclusion of support impro-

ves metabolic outcomes and reduces MS in patients with DM2. 17

Lifestyle changes produced by persuasive ICT counseling decreased the prevalence of MS in 532 adult and elderly participants. In this study, the prevalence of MS and its components were compared between the group without ICT and the group with ICT. 12

In the study that evaluated the effectiveness of using social media for weight management delivered to overweight and obese individuals during a twenty-four week intervention. One group received the program within a Facebook group, along with a support network with the group, and the other intervention group received the same program in a booklet. These results demonstrate the potential of social media to assist overweight and obese individuals with regard to dietary and physical activity modifications for weight management. 10

Adults diagnosed with MetS received general information about cardiovascular disease and MetS risk factors through the website. The intervention group logged into an interactive part, including the My Healthy Heart profile, received a tailored calorie-restricted diet, and used all parts of the interactive prevention program. They indicate the positive impact of a lifestyle

intervention by a web-based program on physical activity, food intake and various dimensions of QOL. 11

## CONCLUSION

The analysis of these studies made it possible to identify that the use of ET in the treatment or prevention of MS had benefits, both in the follow-up of the adult and elderly population, as well as in adolescents. The ET resources used in the selected surveys were: exercise training supported by telemonitoring, Weight management program offered by social media (app), booklet, CHANGE, e-Motivate 4 Change Program, Exergame, ICT Persuasive Counseling (app) and Peer-supported nutrition education program.

It had direct advantages in the risk of complications caused by MS, provided an improvement in mental health, in work performance, and had a positive impact on lifestyle, through the practice of physical activity and balanced food intake. It is suggested the importance of carrying out future studies on the interventions proposed by the new technologies, aimed at the prevention and treatment of MS. ■

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