Castañer-Jorrín, N. S., Gallardo-Sarmiento, A., Perera-Díaz, R. & Sánchez-Sánchez, I. E. (2025) Physical-recreational activities to promote healthy lifestyles in older people with diabetes mellitus. *Atenas*, nro. 63, e11752, 1-13.

Atenas
Revista Científico Pedagógica
ISSN: 1682-2749

Research article

Physical-recreational activities to promote healthy lifestyles in older people with diabetes mellitus

Actividades físicas-recreativas para promover estilos de vida saludable en personas mayores con diabetes mellitus

Atividades físico-recreativas para promoção de estilos de vida saudáveis em idosos com diabetes mellitus

Niurka Siomara Castañer Jorrín
Universidad de Matanzas, Cuba.
https://orcid.org/0000-0003-3963-8442
niurka.castaner@umcc.cu

Abel Gallardo Sarmiento
Universidad de Matanzas, Cuba.
https://orcid.org/0000-0002-6120-0992
abel.gallardo@umcc.cu

Abstract
Physical activity is one of the fundamental pillars in the treatment of type 2 diabetes, which is a common disease especially in people over 60 years of age. Taking into consideration that the population under study has a sedentary lifestyle and little interest in recreational physical activities, which contributes to worsen their health condition and increase the risk of complications associated with the disease, it is proposed to develop a programme of physical-recreational activities to promote healthy lifestyles in older people with DM2. Theoretical, empirical and mathematical or statistical methods were used to study aspects related to the level of health condition and the main deficiencies of the subjects investigated. The results show the need to continue promoting physical activity in the elderly through effective programmes adapted to their individual needs. The conclusions highlight the importance of adapted recreational physical activities to improve the quality of life of older people with DM2. It is emphasized that, while the benefits may apply to a wide range of individuals, it is crucial to consider individual differences when implementing these programmes.

Keywords: physical activity, type 2 diabetes mellitus, healthy lifestyle, elderly.

Received: 15/11/2024 **Evaluated:** 02/12/2024 **Accepted:** 29/12/2024

Atenas
Revista Científico Pedagógica
ISSN: 1682-2749

René Perera Díaz
Universidad de Matanzas, Cuba.
https://orcid.org/0000-0003-3455-1938
rene.perera@umcc.cu

Idelmis Edilia Sánchez Sánchez
Universidad de Matanzas, Cuba.
http://orcid.org/0000-0002-0681-9549
idelmis.sanchez@umcc.cu

Resumen
La actividad física es uno de los pilares fundamentales en el tratamiento de la diabetes tipo 2, la cual es una enfermedad frecuente sobre todo en las personas mayores de 60 años. Tomando en consideración que la población objeto de estudio tiene una vida sedentaria y poco interés en realizar actividades físicas recreativas, lo cual contribuye a empeorar su condición de salud y aumentar el riesgo de complicaciones asociadas a la enfermedad, se propone elaborar un programa de actividades físicas-recreativas para promover estilos de vida saludable en personas mayores con DM2. Se utilizaron métodos teóricos, empíricos y matemáticos o estadísticos que permitieron profundizar en aspectos relacionados con el nivel de condición de salud y las principales deficiencias que presentan los sujetos investigados. Los resultados muestran la necesidad de seguir potenciando la actividad física en las personas mayores mediante programas efectivos y adaptados a las necesidades individuales de los mismos. Las conclusiones destacan la importancia de las actividades físicas recreativas adaptadas para mejorar la calidad de vida de las personas mayores con DM2. Se subraya que, si bien los beneficios pueden aplicarse a un amplio espectro de individuos, es crucial considerar las diferencias individuales al implementar estos programas.
Palabras clave: actividad física, diabetes mellitus tipo 2, estilo de vida saludable, personas mayores.

Resumo
Atividade física é um dos pilares fundamentais no tratamento da diabetes tipo 2, doença comum sobretudo em pessoas com mais de 60 anos de idade. Tendo em conta que a população em estudo apresenta um estilo de vida sedentário e pouco interesse por actividades físicas recreativas, o que contribui para agravar o seu estado de saúde e aumentar o risco de complicações associadas à doença, propõe-se o desenvolvimento de um programa de actividades físico-recreativas para promover estilos de vida saudáveis em idosos com DM2. Foram utilizados métodos teóricos, empíricos e matemáticos ou estatísticos para estudar aspectos relacionados com o nível do estado de saúde e as principais carências dos sujeitos investigados. Os resultados mostram a necessidade de continuar a promover a atividade física nos idosos

Atenas
Revista Científico Pedagógica
ISSN: 1682-2749

através de programas eficazes e adaptados às suas necessidades individuais. As conclusões destacam a importância das actividades físicas recreativas adaptadas para melhorar a qualidade de vida dos idosos com DM2. Salienta-se que, embora os benefícios possam aplicar-se a um vasto leque de indivíduos, é crucial ter em conta as diferenças individuais aquando da implementação destes programas.

Palavras chave: atividade física, diabetes mellitus tipo 2, estilo de vida saudável, idosos.

Introduction

Type 2 diabetes mellitus (DM2) has become one of the main public health challenges worldwide, Cuba is not exempt from this, especially among the elderly population. According to the World Health Organization/Pan American Health Organization (WHO/PAHO, 2023), the prevalence of DM2 in this population group has increased alarmingly, which raises the urgent need to develop effective strategies for its management and prevention, which should be focused not only on medical treatment, but also on the promotion of healthy lifestyles, where physical and recreational activity plays a crucial role. The present study focuses on the elaboration of a weekly physical activity program. physical-recreational activities that can be used as tools to improve the quality of life of older people suffering from this chronic disease.

The background of this research is framed by a context where the aging of the population accompanies a significant increase in chronic diseases, diabetes being one of the most prevalent problems. Different studies such as those by Zavala and Fernández (2018), Perez et al. (2021), Castillo et al. (2023), Arrieta et al. (2022), have shown that incorporating regular physical activity can help control glucose levels, improve overall cardiovascular function, reduce the risk of complications associated with DM2. However, most of these activities are limited by multiple factors, including lack of motivation, sedentary lifestyles, and an unsupportive social environment. The literature suggests that the development of physical activity programs that are recreational and tailored to the abilities of the elderly may be an effective solution to address these challenges.

Currently, this issue is relevant not only because of the growth of the elderly population, but also because type 2 diabetes mellitus is associated with a considerable emotional and social impact. Among the negative effects are decreased independence, the appearance of comorbidities and social isolation, which in turn intensify the risk of complications. In this context, physical-recreational activities not only contribute to improving physical health, but also promote socialization and psychological well-being in this population, factors that are essential for dealing with diabetes in a comprehensive manner.

Atenas Revista Científico Pedagógica ISSN: 1682-2749

Behavior changes theory and models, such as health beliefs, stress the importance of self-efficacy and motivation in the adoption of healthy behaviors (Gil et al., 2021). According to Park and Song (2022), fostering self-efficacy through educational strategies can empower these individuals to make sustainable changes in their daily lives.

A holistic perspective is crucial to address the needs of older people. According to Quishpe et al. (2022), both the social and individual context should be considered, which implies integrating the family and the community in initiatives that promote physical activity. Interventions that involve group dynamics not only promote activity, but also strengthen social support, a factor that is important for the development of physical activity. important in the adherence to an active lifestyle (Ballinas, 2021; Blanco et al., 2021).

The author agrees on some points with the aforementioned authors regarding self-efficacy, the holistic perspective and the benefits of physical activity in the treatment of DM2, however, she disagrees with others such as (Gil et al., 2021) who focus their study on theory and self-efficacy without offering details on practical implementation in communities, in relation to the community role with Quishpe et al. (2022) emphasize the importance of integrating the family and the community in the promotion of physical activity, which could be less visible in the individual approaches proposed by other authors, which could suggest that some approaches may underestimate the impact of the social environment on behavior change and in terms of interventions. Blanco et al. (2021), Ballinas (2021) emphasize the impact of social support on lifestyle changes, but do not offer recommendations on which specific interventions might be more effective compared to those suggested by Quishpe et al. (2022) in trying to integrate families and communities.

Review of these perspectives reveals that, although there is general consensus on the importance of self-efficacy, social support, and physical activity in improving the quality of life of older persons with DM2, there are differences in approaches on how to implement these strategies effectively. The integration of individual and community approaches, as well as attention to the theoretical and practical aspects of behavior change, will be essential to develop a comprehensive program that truly addresses the needs of this population. Promoting healthy lifestyles involves not only empowering individuals, but also creating an enabling environment that supports these long-term changes. The objective of this study is to present an intervention model based on physical-recreational activities that seeks to promote healthy lifestyles in elderly people with DM2 in district 3 in the municipality of Unión de Reyes, Matanzas province, where there is a significant prevalence of this disease.

Atenas Revista Científico Pedagógica ISSN: 1682-2749

Methodology and methods

The present study is descriptive and cross-sectional. A chronological, analytical and logical approach has been used, thus allowing us to obtain an in-depth understanding of the nature of the behavior of individuals in their environment, as well as of the healthy lifestyles that contribute to the maintenance of an optimal state of health. This approach is particularly relevant to the context of the elderly population, where we seek to describe and analyze variables related to recreational physical activities.

The population under study is constituted by elderly people from the 3rd circumscription in the municipality of Unión de Reyes. The sample is made up of a total of 30 individuals, selected by means of intentional sampling, which represents 100% of the population studied. This guarantees adequate representativeness for the study, given that the selection was based on specific criteria related to the research.

The quantitative approach of the study is based on the collection and analysis of numerical data. Numerical quantities and percentages were used to be able to analyze and interpret the information obtained objectively and accurately. The data collection tool used was the survey, which made it possible to obtain direct information from the respondents about their habits and lifestyles.

The research technique applied was the structured survey, composed of closed questions that allowed for systematic data collection. The questionnaire was designed after an exhaustive review of the existing literature and was validated through a pilot test, ensuring its relevance and clarity. The reliability of the instrument was evaluated using Cronbach's reliability coefficient, obtaining a value above 0.80, indicating high internal consistency.

The information was obtained by applying the survey in the field to the 30 selected participants. The surveys were conducted individually, ensuring that each participant understood the questions and could answer them as accurately as possible. The data collected were then entered into a database and processed using statistical software, allowing tabulation and analysis of the results.

Descriptive measures such as frequencies, percentages and averages were used to describe the situation of recreational physical activities in the study population. In addition, comparative analyses were performed to identify possible relationships between lifestyles and health status of the participants.

Atenas Revista Científico Pedagógica ISSN: 1682-2749

Results and discussion

In the survey conducted, the following aspects were evaluated: 1) knowledge about the importance of recreational physical activity in the control of type 2 diabetes mellitus a) Yes, I am very informed b) Yes, but I would like to know more c) No, I am not informed; 2) Performing some recreational physical activities on a regular basis a) Yes, exercise at least 3 times per week b) Yes, exercise once per week c) No, I do not perform physical activity regularly; 3) Whether they have received education on how to control type 2 diabetes mellitus through recreational physical activity a) Yes, I have received information and guidance b) Yes, but I would like to receive more education c) No, I have not received any information about it and 4) the types of recreational physical activities they prefer to do a) Walking b) Swimming c) Dancing d) Other.

Table 1. Results of the survey of elderly people (questions 1, 2 and 3)

No.	Aspects evaluated	Option to choose	% of elderly people
1	Knowledge about the importance of recreational physical activity in the management of type 2 diabetes mellitus.	Yes, I am very knowledgeable	11,8 %
		Yes, but I would like to know more	64,7 %
		No, I am not informed	23,5 %
2	Engaging in some recreational physical activities on a regular basis	Yes, exercise at least 3 times a week	35,3 %
		Yes, exercise once a week	41,2 %
		No, I do not engage in regular physical activity	23,5 %
3	Education on how to manage type 2 diabetes mellitus through recreational physical activity	Yes, I have received information and guidance	23,5 %
		Yes, but I would like to receive more education	52,9 %
		No, I have not received any information in this regard	23,5 %

Own elaboration

Atenas Revista Científico Pedagógica ISSN: 1682-2749

52.3% of the older persons with type 2 diabetes mellitus answered in questions 1 to 3 the second option, observing according to the results obtained that the majority of the respondents indicated that they would like to know more about the importance of recreational physical activity in the control of type 2 diabetes and would like to receive more education about it, which we can interpret that there is a lack of information and education about the importance of recreational physical activities in the control of type 2 diabetes, as well as a lack of commitment to perform activities on a regular basis.

This suggests the need to implement education and counseling programs on the importance of physical activity in the management of diabetes, as well as the promotion of recreational physical activities adapted to the needs and preferences of older people with type 2 diabetes mellitus.

Question # 4. Types of physical recreational activities they prefer to do a) Walking b) Swimming c) Dancing d) Others

The survey data reveal that among the physical recreational activities preferred by older people with DM2, 55% select walking and dancing as their main options. Following, 10% respond that they prefer swimming, while a smaller group chooses "other" activities, which include crafts and walks. These results indicate a clear inclination toward activities that not only promote physical activity, but are also socially integrative and culturally meaningful.

Walking and dancing are activities that can be easily integrated into daily life and require little equipment and can be done in groups, making them accessible options for the older population. On the other hand, the low percentage of preference for swimming suggests that it may not be a viable option for everyone, potentially due to factors such as lack of access to aquatic facilities or limited aquatic skills.

Several authors have studied the importance of physical activity in the control of DM2, such as: Hernández et al. (2018), who state that an exercise program can reduce hemoglobin A1c concentrations and improve glycemic control in people with this disease. On the other hand, Cabrera et al. (2022), Pimenta et al., (2022) and Franco et al. (2024), state that regular physical activity improves insulin sensitivity and helps in blood sugar control. Furthermore, it is suggested that even small amounts of exercise can have significant benefits for those with DM2 (WHO, 2016).

However, to these criteria, there are those of other authors such as: Yates et al., (2012) who recognize the benefits of physical activity, suggesting that the effect of physical activity is less significant than other factors such as weight loss and diet in the management of DM2, emphasizing that the combination of dietary intervention and exercise is more effective than exercise alone.

This article found significant findings that consider the importance of physical exercise in

Atenas Revista Científico Pedagógica ISSN: 1682-2749

the control of DM2, but also identified a lack of information and education in older people with this condition, which is recommended the need for education programs and promotion of physical activity.

The author of the article agrees with Cabrera et al. (2022), Hernandez et al., (2018) and Franco, et al. (2024) that physical activity is crucial for the control of DM2. The benefits they mention, such as increased insulin sensitivity and improved glycemic control. However, they disagree with Yates et al., (2012) in their assertion that physical activity has a lesser effect than other aspects such as diet. While diet is undoubtedly important, he believes that exercise has an integral role that should not be underestimated. In his opinion, exercise not only has physical benefits, but also psychological benefits that are fundamental to the overall well-being of the person with DM2.

Vega et al. (2021) have investigated that recreational physical activity, such as dancing or swimming, can improve glycemic control in people with DM2. Fuertes (2023) refers in his study that physical activity is important and significant in the elderly and is growing over the years, helps prevent non-communicable diseases, lengthens the period of life with preventive medicine, as well as highlighting those recreational activities as a means to stay active, healthy and happy, so physical activity is a determinant for their quality of life.

In the present study we identified that older people with DM2 have preferences for recreational physical activities such as dancing and walking. However, we identified a lack of commitment to perform these activities on a regular basis. It is important to mention that there are discrepancies in studies suggesting that swimming and resistance exercises are equally important for the population with DM2, as they can contribute not only to glucose control, but also to the improvement of strength and muscle mass, as Botana (2024) points out.

The studies of the aforementioned authors support the importance of recreational physical activity in the control of DM2 and the need for educational programs to inform and motivate older people with this condition to exercise regularly, as well as to identify areas of opportunity to improve education and promotion of recreational physical activity in this population. It is important to consider effective strategies to encourage the participation and engagement of older people with DM2 in regular physical activity, as well as tailoring activities to their individual preferences to increase adherence and health benefits. In addition, it is essential to involve health professionals in the promotion of physical activity as an integral part of the treatment and management of DM2.

The survey results extend the findings of previous studies by providing specific information on the lack of knowledge, education, and engagement in recreational physical activity among older persons with DM2. In addition to agreeing with the existing literature that emphasizes the importance of

Atenas Revista Científico Pedagógica ISSN: 1682-2749

physical activity for the management of DM2 in the elderly population. According to Analuiza et al. (2020), walking is one of the most recommended forms of exercise for the elderly due to its low impact and its ability to improve cardiovascular health and glycemic control. In this regard Morales et al. (2024) argue that activities such as dancing not only provide physical benefits, but also foster social interaction, which is crucial for the emotional well-being of this population. This can help to healthy and happy, so physical activity is a determinant for their quality of life.

In the present study we identified that older people with DM2 have preferences for recreational physical activities such as dancing and walking. However, we identified a lack of commitment to perform these activities on a regular basis. It is important to mention that there are discrepancies in studies suggesting that swimming and resistance exercises are equally important for the population with DM2, as they can contribute not only to glucose control, but also to the improvement of strength and muscle mass, as Botana (2024) points out.

The studies of the aforementioned authors support the importance of recreational physical activity in the control of DM2 and the need for educational programs to inform and motivate older people with this condition to exercise regularly, as well as to identify areas of opportunity to improve education and promotion of recreational physical activity in this population. It is important to consider effective strategies to encourage the participation and engagement of older people with DM2 in regular physical activity, as well as tailoring activities to their individual preferences to increase adherence and health benefits. In addition, it is essential to involve health professionals in the promotion of physical activity as an integral part of the treatment and management of DM2.

The survey results extend the findings of previous studies by providing specific information on the lack of knowledge, education, and engagement in recreational physical activity among older persons with DM2. In addition to agreeing with the existing literature that emphasizes the importance of physical activity for the management of DM2 in the elderly population. According to Analuiza et al. (2020), walking is one of the most recommended forms of exercise for the elderly due to its low impact and its ability to improve cardiovascular health and glycemic control. In this regard Morales et al. (2024) argue that activities such as dancing not only provide physical benefits, but also foster social interaction, which is crucial for the emotional well-being of this population. This can help to identify areas for improvement in physical activity education and promotion programs for this population,

However, it is important to keep in mind some possible weaknesses or shortcomings of the study conducted, such as the small sample of participants surveyed, which may not be representative of the general population of older people with DM2. In addition, the survey was

Atenas Revista Científico Pedagógica ISSN: 1682-2749

based on self-reported responses, which may lead to biases in the information provided. Therefore, larger and more representative studies are recommended to validate the results obtained in this survey.

Promotion, prevention, education and control actions for the treatment of DM2 in the elderly through recreational physical activities:

Promotion: perform recreational activities such as walking, dance or yoga classes, outdoor excursions, among others to promote an active and healthy lifestyle. These activities will help improve physical fitness, reduce stress and promote social interaction, which promotes overall well-being.

Prevention: promote healthy eating habits, perform periodic blood glucose, blood pressure and weight checks, as well as encourage adherence to medical treatment, self-evaluation and self-management of the disease. In addition, educational talks can be given on the importance of maintaining a healthy weight, controlling blood glucose and leading an active lifestyle to prevent complications of DM2.

Control: through recreational physical activities, relaxation and breathing techniques can be taught to help control stress and anxiety, factors that can negatively affect the health of these people. Healthy lifestyle habits can also be promoted, such as regular physical activity, a balanced diet and compliance with medical indications to keep blood glucose levels, blood pressure and body weight under control. Constant monitoring of these parameters is essential to prevent complications and keep the disease under control in older people with DM2.

Taking into consideration the above actions, a weekly program will be elaborated below:

Table 2. Proposed weekly program for physical-recreational activities to promote healthy lifestyles in elderly people with type 2 diabetes mellitus.

Day	Activities
Monday	Educational session on the benefits of physical activity in the control of DM2, given by a diabetes specialist.
	Individualized counseling session to set weekly physical activity goals and plan an exercise program tailored to each person's needs and abilities.
Wednesday	Gentle, tailored exercise classes for older people with DM2, led by a physiotherapist or community physical activity teacher.
	Informative talk on the importance of nutrition in the control of diabetes and how to combine it with physical activity to improve health.
Friday	Monitoring session and evaluation of physical activity goals at the beginning of the week.
	Recreational activities such as group walking, dance class or adapted yoga to promote participation and social well-being of people with DM2.

Received: 15/11/2024 **Evaluated:** 02/12/2024 **Accepted:** 29/12/2024

Atenas Revista Científico Pedagógica ISSN: 1682-2749

Saturday	Excursion to nature or group outing to practice outdoor activities, such as short walks in parks and gardens, visits to museums with slow guided tours, tai chi classes, picnics in quiet places in natural environments with reduced mobility activities, promoting the continuity of physical activity in a different and motivating environment, these activities allow seniors to enjoy the outdoors, socialize with others and stay active in a safe and pleasant way.
	Q&A session with a diabetes specialist to answer questions and provide additional information on how to maintain a healthy lifestyle with DM2.
Sunday	Relaxation and breathing session to help reduce stress and improve emotional management of DM2.
	Development of a plan of physical and self-care activities for the coming week, taking into account the individual interests and objectives of each participant.

Own elaboration

This weekly program seeks to educate, motivate and support older people with DM2 in adopting an active and healthy lifestyle, thus promoting disease control and improving their quality of life.

Conclusions

The conclusions highlight the importance of adapted recreational physical activities to improve the quality of life of older people with DM2. It is emphasized that while the benefits may apply to a broad spectrum of individuals, it is crucial to consider individual differences when implementing these programs. The survey results indicate that these activities can positively impact mood, reduce stress, and help maintain a healthy weight. In addition, the need for education and guidance on physical activity in the management of diabetes is emphasized, suggesting that a combination of these actions can promote healthy lifestyles. Finally, the importance of continuing research in this area to improve treatments and the well-being of the elderly population with this condition is highlighted.

Bibliographic references

Analuiza, A.E., Cáceres Sánchez, C., Ambato Campos, N. & Campos, C.G. (2020). Physical, recreational and cultural activity, an alternative to improve the quality of life of rural older adults. *Revista Digital de Educación Física EmásF,* (62), 90-105. https://dialnet.unirioja.es/servlet/articulo?codigo=7186182

Arrieta, F., Botet, J.P., Iglesias, P., Obaya, J.C., Montanez, L., Maldonado, G.F., Becerra, A., Navarro, J., Pérez, J.C., Petrecca, R., Pardo, J.L., Rebalta, J., Sánchez Margalet, V., Duran, S., Tébar, F.J. & Aguilar, M. (2022). *Diabetes*

Atenas Revista Científico Pedagógica ISSN: 1682-2749

mellitus and cardiovascular risk: update of the recommendations of the Working Group on Diabetes and Cardiovascular Disease of the Spanish Diabetes Society. DOI: 10.1016/j.arteri.2021.05.002 https://goo.su/XKpbnu

Ballinas, Y. (2021). *The importance of a healthy lifestyle*. https://repositorio.essalud.gob.pe/bitstream/handle/

Blanco, E., Chavarría, G. & Garita, Y. (2021). Healthy lifestyle in type 2 diabetes mellitus: benefits in chronic management. *Revista Médica Sinergia, 6* (2). https://doi.org/10.31434/rms.v6/2639

Botana, A. (2024). Strategy for prevention and non-pharmacological treatment of diabetes. Model of care. *Revista Atención Primaria,* (9). https://ouci.dntb.gov.ua/en/works/7XkVXmb9/

Cabrera, J., Carvajal, F., Carvajal, M., Ramos, A. & Rodríguez, A. (2022). Importance of physical exercise in people with diabetes mellitus. *Digital Journal Science and Health, 6* (2). https://doi.org/10.22206/cysa.2022.v6i2.pp35-42

Castillo, A., Suárez, Y. and Arias, H. (November 30, 2023). Therapeutic physical activities in relation to gait and balance in type 2 diabetic complicated with distal diabetic peripheral neuropathy [Scientific Paper]. International Congress of Biomedical Sciences: CIBAMAZ 2023, Manzanilo, Granma, Cuba. https://cibamanz.sld.cu/index.php/cibamanz/2023/paper/view/685

Franco, L.I., Simanga, G., Robles, I., Montes, K.J & Aguirre, J.F. (2024). Beyond glycemic control: benefits of physical activity on quality of life in people with type 2 diabetes mellitus: a narrative review. *Retos Journal 53*, 262- 270. https://recyt.fecyt.es/index.php/retos/article/view/101811/75931

Fuertes, J. (2023). Physical activity and quality of life in the older adult: systematic review. *Revista Científica GADE, 3* (1). https://revista.redgade.com/index.php/Gade/article/view/190

Gil, M., Pons, M., Rubio, M., Murrugarra, G., Maslukh, B., Rodríguez, B., García, A., Vidal, C., Conejo, S., Recio, J.I., Martínez, C., Pujol, E. & Berenguera, A. (2021). Theoretical models of health promotion in routine practice in primary health care. *Gac Sanit, 35*(1), 48—59. https://scielo.isciii.es/pdf/gs/v35n1/0213-9111-gs-35-01-48.pdf

Hernández, J., Domínguez Y.A. & Mendoza, J. (2018). Beneficial effects of physical exercise in people with type 2 diabetes mellitus. *Cuban Journal of Endocrinology, 29* (2). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-29532018000200008

Morales, A., Lóriga, J.J., Navarro, G. & Alejandro, M. (2024). Evaluation of the social benefits of recreational activities. *Conrado Journal, 20* (98). https://goo.su/kKsp

Pan American Health Organization (PAHO), and World Health Organization (WHO) (2023). *World Diabetes Day*. https://www.paho.org/es/campanas/dia-mundial-diabetes-2023

Park, K. & Song, Y. (2022). *Multimodal Diabetes Empowerment for Older Adults with Diabetes*. https://goo.su/kf9tzE

Pérez, K., Sánchez, F., Sánchez, A.J., García, A., de la Rosa, J.D. & Calás, J.J. (2021). *Triggering factors of diabetic foot in patients with diabetes mellitus.* ECIMED. http://www.ecimed.org

Atenas Revista Científico Pedagógica ISSN: 1682-2749

Pimenta, N., Brito, I., Monteiro, D., Moreira, M and Pereira, M. (2022). Promoting Physical Activity in Older Adults with Type 2 Diabetes via an Anthropomorphic Conversational Agent: Development of an Evidence and Theory-Based Multi-Behavioral Intervention. *Frontiers in Psychology Journal. 13* (13). https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.883354/full

Quishpe, M., Tixi, N.S., Quijosaca, L.A., Llerena, G.E., Camacho, E.M., Sois, U. & Calvopiña, J.O. (2022). Educational intervention in patients with type II diabetes mellitus. *Cuban Journal of Rheumatology. 24* (1). https://goo.su/5WO50CT

Vega, R., Vega, I.O., Vega, J. & Milian, S. (2021). Obesity in diabetes mellitus: a great danger to heart and life. *CorSalud Journal. 13* (1). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2078-71702021000100120

World Health Organization (2016). *World Diabetes Report.* https://iris.who.int/bitstream/handle/10665/254649/9789243565255-spa.pdf

Yates, T. (2012*). Role of physical activity in the management of obesity and type 2 diabetes.* https://diabetesonthenet.com/wp-content/uploads/dip1-1-28-33-1.pdf

Zavala, A. & Fernández, E. (2018). Diabetes mellitus type 2 in Ecuador: Epidemiological review. *Revista Técnica Universidad de Ambato. Mediciencias UTA, 2*(4), 20-26. https://revistas.uta.edu.ec/erevista/index.php/medi/article/view/1219

Author contribution

Niurka Siomara Castañer Jorrín: Conceptualization, research, writing of the original draft and visualization.

Abel Gallardo Sarmiento: research, validation, writing, review and editing.

René Perera Díaz: writing-review and editing.

Idelmis Edilia Sánchez Sánchez: conceptualization and methodology.

Conflict of interest

The authors declare that there is no conflict of interest.

Received: 15/11/2024 **Evaluated:** 02/12/2024 **Accepted:** 29/12/2024