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EFFICACY OF EDUCATIONAL PROGRAMS IN GLYCEMIC CONTROL OF ELDERLY INDIVIDUALS WITH TYPE II DIABETES
SYSTEMATIC LITERATURE REVIEW

EFICÁCIA DOS PROGRAMAS EDUCACIONAIS NO CONTROLO GLICÉMICO DA PESSOA IDOSA COM DIABETES TIPO II
REVISÃO SISTEMÁTICA DA LITERATURA

EFICACIA DE LOS PROGRAMAS EDUCATIVOS EN EL CONTROL GLUCÉMICO DE PERSONAS MAYORES CON DIABETES TIPO II
UNA REVISIÓN SISTEMÁTICA DE LA LITERATURA

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ABSTRACT

Type II diabetes mellitus is the most common form of diabetes mellitus, accounting for 90% of diabetes patients. This health condition leads to microvascular and macrovascular complications that have psychological and physical impacts on both the elderly individual and their family, as well as on healthcare systems. Educational programs aimed at promoting glycemic control in elderly individuals with diabetes are an important tool to empower this population. They provide knowledge about their own disease with the goal of promoting self-management and the adoption of a healthy lifestyle.

Objective: To identify the effectiveness of nursing educational programs in glycemic control in elderly individuals with type II diabetes mellitus.

Methodology: Research was conducted in the CINAHL Complete database via EBSCOhost, Medline Complete via PubMed, Scopus, and Web of Science, with relevance to the identified issue. Articles written in Portuguese, English, or Spanish with publication dates between 2018 and 2023 were identified. After applying the inclusion and exclusion criteria to address the PICOD question, the articles found were analyzed, and 6 articles were included in the study. Levels of evidence were identified according to the Joanna Briggs Institute classification[1].

Results: Educational programs contribute to increased glycemic self-control. Through these programs, the elderly acquire knowledge that can lead to improved self-care behaviors, a decrease in HbA1c levels, prevention of diabetes symptom exacerbations, and an improvement in quality of life.

Conclusion: Educational programs contribute to a significant reduction in HbA1c in elderly individuals with diabetes, which can lead to a decrease in complications associated with retinopathy and other microvascular and macrovascular conditions.

Keywords: Elderly; Health Education; Glycemic Control; Nursing; Programs; Type II Diabetes Mellitus.

RESUMO

A diabetes mellitus tipo II é a forma de diabetes mellitus mais comum, representando 90% dos doentes com diabetes. Esta condição de saúde induz a complicações microvasculares e macrovasculares que causam impacto psicológico e físico, tanto para a pessoa idosa como para a família, com impacto nos sistemas de saúde. Os programas educacionais para promover o controlo glicémico da pessoa idosa com diabetes, constituem um importante instrumento para capacitar esta população. Possibilitam o conhecimento da sua própria doença, com o intuito de promover autogestão e adoção de um estilo de vida saudável.

Objetivo: Identificar a eficácia dos programas educacionais de enfermagem no controlo glicémico, em pessoas idosas com diabetes mellitus tipo II.

Metodologia: Pesquisa realizada nas bases de dados *CINAHL Complete* via *EBSCOhost*, *Medline Complete* via *Pubmed*, *Scopus* e *Web of Science*, com pertinência para a problemática identificada. Identificaram-se artigos escritos em português, inglês ou espanhol com data de publicação compreendida entre 2018 e 2023. Depois de implementar os critérios de inclusão e exclusão de forma a dar resposta à pergunta PICOD, procedeu-se à análise dos artigos encontrados, tendo sido incluídos seis artigos no estudo. Os níveis de evidência foram identificados de acordo com a classificação do Instituto Joanna Briggs[1].

Resultados: Os programas educacionais, contribuem para aumentar o autocontrolo glicémico. Através destes programas o idoso adquire conhecimentos que podem contribuir para a melhoria de comportamentos de autocuidado, com a diminuição dos níveis de HbA1 é possível avaliar a eficácia do tratamento e método utilizado, ajudando na prevenção de agravamentos dos sintomas da diabetes e melhoria da qualidade de vida.

Conclusão: Os programas educacionais, contribuem para uma redução significativa do HbA1c em idosos com diabetes o que pode levar a uma diminuição das complicações, associadas, retinopatia e outras condições microvasculares e macrovasculares.

Palavras-chave: Controlo Glicémico; Diabetes Mellitus tipo II; Educação para Saúde, Enfermagem; Idosos; Programas.

RESUMEN

La diabetes mellitus tipo II es la forma más común de diabetes mellitus, representando el 90% de los pacientes con diabetes. Esta condición de salud conlleva complicaciones microvasculares y macrovasculares que tienen un impacto psicológico y físico tanto en la persona de edad avanzada como en su familia, así como en los sistemas de salud. Los programas educativos destinados a promover el control glucémico en personas de edad avanzada con diabetes son una herramienta importante para empoderar a esta población. Proporcionan conocimiento sobre su propia enfermedad con el objetivo de promover la autogestión y la adopción de un estilo de vida saludable.

Objetivo: Identificar la efectividad de los programas educativos de enfermería en el control glucémico en personas de edad avanzada con diabetes mellitus tipo II.

Metodología: La investigación se llevó a cabo en la base de datos *CINAHL Complete* a través de *EBSCOhost*, *Medline Complete* a través de *PubMed*, *Scopus* y *Web of Science*, con relevancia para el problema identificado. Se identificaron artículos escritos en portugués, inglés o español con fechas de publicación entre 2018 y 2023. Después de aplicar los criterios de inclusión y exclusión para abordar la pregunta PICOD, se analizaron los artículos encontrados y se incluyeron 6 artículos en el estudio. Los niveles de evidencia se identificaron según la clasificación del Instituto Joanna Briggs[1].

Resultados: Los programas educativos contribuyen a aumentar el autocontrol glucémico. A través de estos programas, los ancianos adquieren conocimientos que pueden llevar a una mejora en los comportamientos de autocuidado, una disminución en los niveles de HbA1c, la prevención de exacerbaciones de los síntomas de la diabetes y una mejora en la calidad de vida.

Conclusión: Los programas educativos contribuyen a una reducción significativa de la HbA1c en personas de edad avanzada con diabetes, lo que puede llevar a una disminución de las complicaciones asociadas con la retinopatía y otras condiciones microvasculares y macrovasculares.

Descriptores: Ancianos; Control Glucémico; Diabetes Mellitus tipo II; Educación para la Salud; Enfermería; Programas.

INTRODUCTION

Diabetes is a chronic and progressive disease, considered a public health problem worldwide and it is related to high social and health system costs. According to Chatterjee[3], type II diabetes (DM II) represents more than 90% of patients with diabetes and leads to microvascular and macrovascular complications that cause psychological and physical suffering for both the person and their family, also causing impact on health systems. The high prevalence of this condition is associated with factors related to the current lifestyle, such as reduced physical exercise and unhealthy eating habits that lead to an increase in fat mass in the human body[4].

The global prevalence of diabetes mellitus has almost doubled since 1980, from 4.7% to 8.5% in the adult population. Currently, it is assumed that there are 463 million adults with diabetes[5].

In 2040, this value will rise to 700 million. The number of people with type 2 diabetes mellitus has been increasing in most countries, with one in every 5 people over 65 years-old having diabetes[6].

In 2018, the estimated prevalence of Diabetes in the Portuguese population aged between 20 and 79 (7.7 million individuals) was 13.6%, this means that more than 1 million Portuguese people in this age group have Diabetes. The impact of the aging of the age structure of the Portuguese population (20-79 years-old) was reflected in an increase of 1.9 percentage points in the Diabetes prevalence rate between 2009 and 2018, which corresponds to an increase of around 16.3% in the last 10 years, thus being responsible for 10% of health spending in 2018[6].

Concern is increasingly identified with this problem, since in the long-term hyperglycemia induces intense pathological processes[7].

In this regard, it is essential to implement educational strategies that raise awareness among the population about DM II, including therapeutic management and other self-care practices associated with the condition.

Guimarães *et al*[8] states that nurses have a preponderant role in the training of elderly people with diabetes mellitus by providing health education actions in a detailed and in-depth way, in accordance with the identification of these people's well-being needs. The importance of nurses is highlighted in the need to provide guidance on drug and non-drug treatment and promote empowerment. If the elders are able to adopt healthy daily habits and develop actions to control the pathology, complications can be prevented.

Educational programs for people/families with diabetes contribute to the prevention of complications through self-management of the disease. They enable people to understand the factors that contribute to a bad prognosis, encouraging the adoption of daily habits to try to avoid them.

According to Favaro *et al*[9], studies point to the need to develop educational programs, contributing to changing attitudes and reducing large costs in health systems. This aims to promote actions in two levels of prevention: primary and secondary.

The objective of this systematic literature review was to identify the effectiveness of nursing educational programs in glycemic control in elderly people with type II diabetes mellitus.

METHODOLOGY

Research Question

As Bettany-Saltikov[10] states, in a systematic review of the literature, determining the focus of the problem constitutes the first and most fundamental step in planning. It must contain the formulation of a guiding question, which must be understandable and specific. The same author also says that the question should contain three or four elements. In this way, the PICOD strategy was used (P – Population; I – Intervention; C – Comparison; O – Outcome/Result and D – Design, which establishes a guiding thread for the research (Chart 1↗).

In order to respond to the objective outlined above, the following PICO question was defined: "How effective educational nursing programs (intervention) are in glycemic control (results) in elderly people with type II diabetes mellitus (Population)".

Inclusion and Exclusion Criteria

According to Patino *et al*[11], the establishment of inclusion and exclusion criteria is a standard and necessary practice in the preparation of quality scientific studies. Inclusion criteria are defined as the key characteristics of the target population that researchers will use to answer the study question.

For this review, the following inclusion criteria were defined: randomized controlled studies, experimental studies without randomization, cohort and case-controlled studies, observational studies without a control group, cross-sectional studies, case series and clinical trials; with text published in full (full-text); relevant to the identified problem; written in Portuguese, English or Spanish and with a publication date between 2017 and 2023. On the other hand, the exclusion criteria consider studies that do not have a previously described

scientific methodology, with publication less than 2017, in a different language and duplicates in the databases of data used.

Research Strategies

The article search occurred during the month of June 2023. A strategy was developed using indexed terms, alternative terms, as well as truncations and the Boolean operators AND and OR. The search was carried out in the databases CINAHL Complete via EBSCOhost, Medline Complete via Pubmed, Scopus and Web of Science, in the fields of title, abstract, title/summary, subject, all fields and mesh terms, according to the different databases of data. Chart 2↗ shows the research strategy used at Pubmed.

The Mesh descriptors used were the following: "Program", "Education [MesH Terms]", "Nursing [MesH Terms]", "Glycemic Control [MesH Terms]", "Efficacy", "Effectiveness", "Diabetes", " Nurs*", "Elderly", "Type II diabetes mellitus [MesH Terms]".

Study Selection Procedure

After identifying the research question, defining the inclusion and exclusion criteria and the research strategy, the study selection procedure was defined by selecting what were the most relevant and irrelevant to this study[12].

All identified citations were exported, and duplicates were removed in this process. The selection of studies was carried out in two phases: the first one includes reading their titles and abstracts and eliminating those studies that did not meet the eligibility criteria; In the second phase, the full text of the studies identified during the first phase as potentially relevant was read. This article selection and screening process was carried out independently by two reviewers.

The database search was carried out in June 2023, where 154 articles were identified in the databases identified above. Of these, thirty-one (31) articles were identified in the Pubmed database, thirteen (13) were identified in the EBSCOhost database, sixty-three (63) identified in the Scopus database and forty-seven (47) were identified in the Web of Science database.

Following the article selection procedures, the final sample of this systematic review consisted of six articles, as shown in Figure 1↗.

The contribution of the Joanna Briggs Institute[1] was used to classify the level of evidence of the articles, as well as to assess their methodological quality[2]. Chart 3↗ identifies and hierarchizes the types of studies included in this review, according to the levels of evidence, and Table 1↗ shows the quality assessment, based on the Critical Appraisal Checklist for RCTs[2].

RESULTS

The results of the article analysis are shown in Chart 4↗, in which the topics studied are described, as well as the authors, year, country, sample, participants, type of study, level of evidence, objectives and respective results of each investigation.

At the design level, the six (6) studies identified, which correspond to 100% of the studies included in this systematic literature review, five (5) are randomized and controlled experimental studies, corresponding to 83.33% and one (1) article corresponds to an uncontrolled randomized experimental study corresponding to 16.67%.

Regarding the countries of the studies, two (2) originate from Singapore, one (1) article from Taiwan, one (1) from New Zealand, one (1) from Spain and one (1) article from Australia (Chart 4↗) .

According to the authors identified in the studies, nurses must train diabetic people to demonstrate a set of self-care behaviors, such as practicing physical activity, planning their diet, managing their therapy, monitoring blood glucose and ketonuria levels, take care of your feet, in addition to seeking other care, associated with other morbidities that may exist.

Nurses must use the different spaces they occupy in health services to promote educational actions that guide diabetics on the recognition, prevention and treatment of complications related to diabetes. According to the results found in the study by Tan, *et al* (2019)[13], educational programs provide a significant increase in self-efficiency, diabetes self-care activities, HbA1c values, thus improving self-efficiency, motivated by behavioral change in health, leading to a reduction in the use of health services. A study carried out with 236 participants, in which the effectiveness of using a structured, individualized education program for elderly people with type 2 diabetes was evaluated, demonstrates a significant reduction in glycated hemoglobin in the intervention group and a consequent 25% reduction in complications microvascular diseases, a 10% reduction in diabetes-related mortality, and a 6% reduction in all-cause mortality[14].

The authors also concluded that some educational programs enable participants to be encouraged to find their own coping strategies and goals, enabling them to correctly manage self-care. These can be interpreted as a way to slow the progression of the disease[14].

RESULTS DISCUSSION

After presenting the results obtained, a critical and precise analysis was conducted. It was possible to confirm that all articles were consensual and similar regarding the effectiveness of nursing educational programs in glycemic control in elderly people with type II diabetes mellitus. For the authors, the population with diabetes must be monitored by a multidisciplinary team, where it is essential that there is combined and integrated action between professionals and where it is necessary for each one to know their role and importance. People with diabetes are at greater risk of developing health problems such as decreased quality of life, disability and death. The significant reduction in glycated hemoglobin consequently leads to a reduction in complications and mortality. We present a brief comparison of the results in order to answer the guiding question of this review: identifying the effectiveness of nursing educational programs in glycemic control in elderly people. The emphasis on the contribution of educational programs was reflected, mainly, in the adequacy of the diet and physical activity, in the prevention and treatment of complications, as well as the impact on health services and an alert to health professionals to implement this program. Nursing can promote actions aimed at maintaining the autonomy of diabetic people in addition to health care programs. The educational program must be targeted according to people's needs and guide diabetics on recognition, prevention, treatment and adoption of healthy lifestyle habits so that complications can be postponed and/or avoided. Limitations may have arisen because some of the studies represent a weaker methodological quality, based on the Critical Appraisal Checklist for RCTs[2], as is the example of study one (1) with a result of 67%, presented in Table 1↗.

Effectiveness of educational programs in glycemic control

In the study carried out by Coria *et al*[14], six face-to-face sessions lasting 30 minutes were held, which consisted of structured and individualized education, carried out by a trained nurse with more than 10 years of experience in education about type II diabetes mellitus.

They were taught over a period of six months, with educational reinforcements after 12 and 18 months. This research concluded that comprehensive care for elderly people with diabetes requires action to be taken through education programs, aiming to improve people's knowledge and behavior in relation to self-management of the disease. Education about diabetes can optimize a person's glycemic control, and carried out on an ongoing basis can enable them to achieve favorable long-term results.

Innovative strategies, such as educational reinforcement and family involvement, can contribute to increasing glycemic control capacity[15].

The implementation of educational programs for elderly people with type II diabetes in the clinical environment has effects on improving HbA1c and self-care behaviors. These programs enable participants to focus on their individualizing self-care behaviors, being able to manage their health condition, at home, according to their individual needs[13].

Diabetes self-management education programs in the elderly individuals are effective in increasing knowledge, skills and motivation in controlling the disease with associated improvements in outcomes[13].

In the study carried out by Lin *et al*[16], with 60 participants selected from the endocrinology service at a medical center in southern Taiwan, divided into 30 participants for each group, the participants in the experimental group received a mindfulness program throughout nine weeks. This program consisted of meditations, education techniques and exercises taught by a Nurse trained in mindfulness strategies.

The researchers concluded that the intervention group showed better glycemic control, with a significantly greater reduction in HbA1c from baseline to post-test, during the two-month study period, compared to the control group, which received only usual health care.

A 0.9% reduction in glycated hemoglobin is associated with a 25% reduction in microvascular complications, a 10% reduction in diabetes-related mortality, and a 6% reduction in all-cause mortality[15].

The application of educational programs to 138 participants, with an average age of 65 years-old or more, showed that the severity levels of diabetes symptoms were significantly lower in the experimental group, when it's compared to the control group, which did not participate in the program and received the usual health care. It was also concluded that intensive care for diabetes mellitus, with patient empowerment, can lead to sustained glycemic control, reduction of clinical complications, such as the progression of nephropathy and incidence of cardiovascular complications[14].

Nursing interventions should focus on glycemic control, through diet, physical activity, medication, measurement of blood pressure and blood lipids, as well as collaboration in periodic examinations to early detect possible eye, kidney or foot injuries. These authors also state that all of these measures can prevent or delay the complications of diabetes[16].

According to Chen *et al*[17], the economic costs related to diabetes, due to possible employment constraints, medication costs, hospitalization and outpatient care are very high, both for the elderly person and for the health systems. Educational programs provided positive effects on elderly people who are in long-term care units by helping to plan their care in these institutions.

The educational activity can be carried out individually or in a group, in person, by telephone or internet, over a certain period (semester, quarterly, monthly or weekly) with or without the presence of the family.

In the results of the study Tan *et al*[18], the program to increase diabetes self-efficacy was applied to elderly people with type II diabetes, for eight weeks, through a guide on diabetes self-care, a one-day workshop and telephone calls fortnightly follow-up.

With the application of the program, there was a significant increase in self-efficiency, diabetes self-care activities, normalization of HbA1c values and less unplanned use of health services, during the two-month study period, compared to the group of control, who did not participate in the program[18].

Improved self-efficiency motivates health behavior change and has been associated with increased diabetes self-care activities, leading to reduced use of health services[18].

CONCLUSION

This systematic review of the literature allowed us to understand the effectiveness of nursing educational programs in glycemic control in elderly people with type II diabetes mellitus.

It was possible to understand that complications related to diabetes impose a heavy burden on their self-care activities, which can affect their expectations of self-efficacy in glycemic control.

The authors state that educational programs provide positive effects on elderly people with diabetes who seek care in health services. These programs allow them to know the risk factors, what can contribute to preventing complications. Health education actions are considered fundamental in the treatment of type II DM and represent an effective means of contributing to improving their lives.

Appropriate diabetes education empowers elders to self-manage the disease, promotes self-care and lifestyle changes, through knowledge in nutrition, physical activity, adequate use of appropriate medications and risk reduction behavior, considered essential for glycemic control and prevention of complications arising from the disease.

Educational programs can be applied with different organizational structures and with varying duration, considering the person's needs.

Information can be transmitted through direct contact or remotely.

This systematic review of the literature constitutes an important contribution and alert to nursing practice, as it allows a reflection on this problem and on the relevance of the care provided by nurses, aiming to implement strategies and intervention programs in favor of developing capacity for nursing in the control of glycemic levels in elderly people with diabetes, with consequences for improving their quality of life.

Despite the evidence found, we recognize the lack of articles related exclusively to the elderly individuals, with the majority of studies aimed at the general population. The number of studies that investigate diabetes in older adults is small, which limits the analysis in this area, with the possibility of omitting relevant aspects on the topic. It makes it a priority for me to expand research into this increasingly broad population, to increase the average life expectancy currently achievable.

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LK: Study coordination, study design, data collection, storage, and analysis, review and discussion of results.
MC: Study design, data analysis, review, and discussion of results.
AN: Study design, data analysis, review, and discussion of results.
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Chart 1 – PICOD strategy demonstration.

P (Population)	Elderly person with type II diabetes mellitus
I (Intervention)	Nursing Educational Programs
C (Comparison)	--------
O (Outcome/Result)	Glycemic control
D (Design)	Systematic literature review

Chart 2 – Search on Pubmed.

#1	((((((Program [MeSH Terms]) OR (education [MeSH Terms])) OR (patient education as topic [MeSH Terms])) OR (health education [MeSH Terms])) OR ("educational program*"[Title/Abstract])) OR (program*[Title/Abstract])) OR (education [Title/Abstract])	2,158,731
#2	((nurs*[Title/Abstract]) OR (nursing [MeSH Terms])) OR (nurses [MeSH Terms]) ((((((Glycemic Control [MeSH Terms]) OR (Blood Glucose [MeSH Terms])) OR	687,495
#3	(Glycemic Index [MeSH Terms])) OR (Glycated Hemoglobin A [MeSH Terms])) OR (glycemic [Title/Abstract])) OR (glucose [Title/Abstract])) OR (Hba1c[Title/Abstract])	662,499
#4	((((((aged[MeSH Terms]) OR (Aged, 80 and over[MeSH Terms])) OR (aged[Title/Abstract])) OR (elderly[Title/Abstract])) OR (geriatric[Title/Abstract])) OR (seniors[Title/Abstract])) OR (old man[Title/Abstract])	4,147,250
#5	"Diabetes mellitus type 2"[Title/Abstract] OR "Non insulin dependent diabetes"[Title/Abstract] OR "Adult onset Diabetes"[Title/Abstract] OR "Niddm"[Title/Abstract] OR "T2dm"[Title/Abstract]	49,182
#6	#1 AND #2 AND #3 AND #4 AND #5, 2017-2023, Portuguese, English and Spanish	32

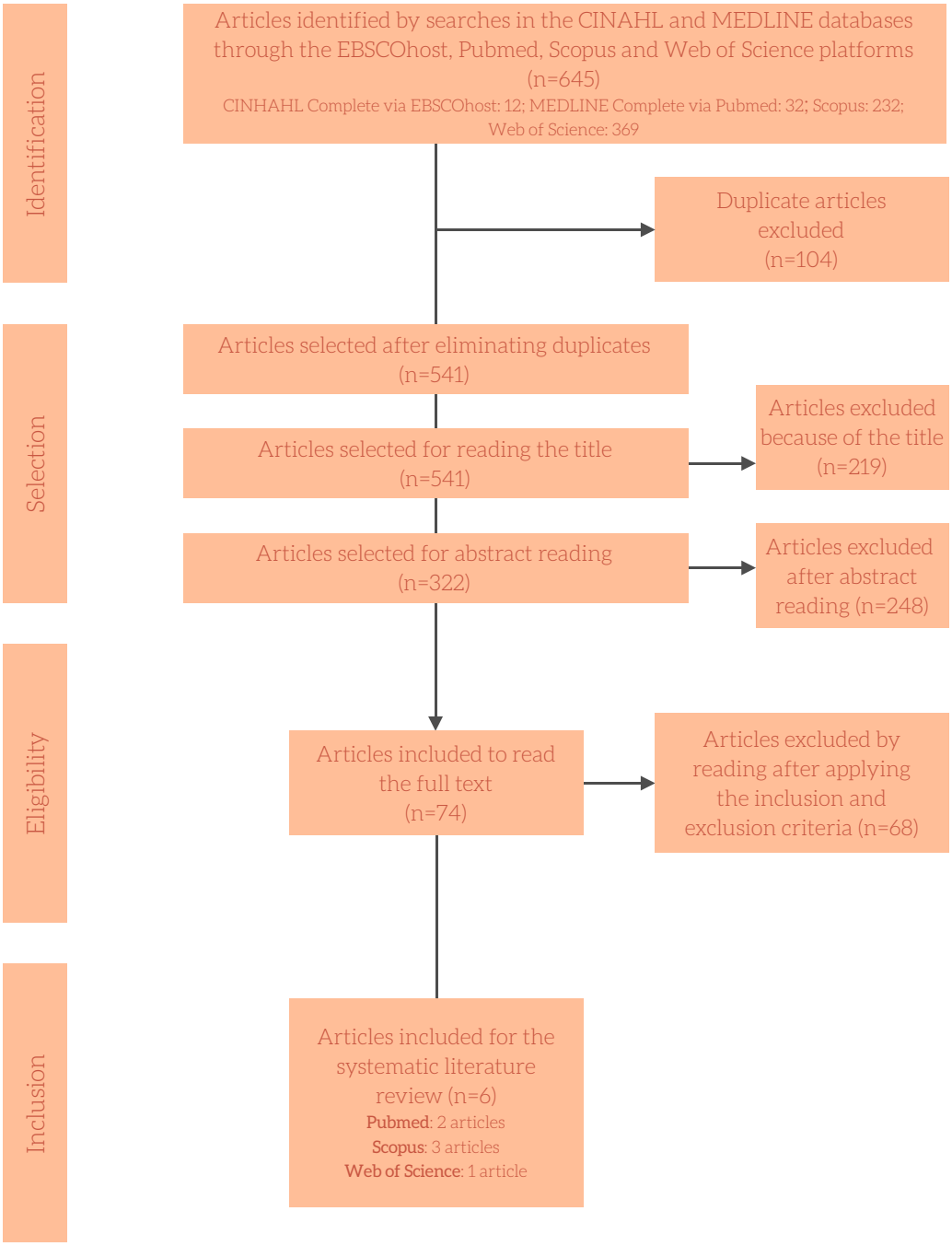

Figure 1 – Flowchart based on the PRISMA 2020 model, with the results of article selection.

Chart 3 – Evidence level of the articles.

Articles/Authors	Type of study	Evidence level
Study 1 Coria *et al*[11]	Randomized Controlled Trial (RCT)	Level 1. c
Study 2 Chen *et al*[15]	Randomized Controlled Trial (RCT)	Level 1. c
Study 3 McLeod, *et al*[12]	Randomized Controlled Trial (RCT)	Level 1. c
Study 4 Lin *et al*[14]	Randomized Controlled Trial (RCT)	Level 1. c
Study 5 Tan *et al*[13]	Randomized Controlled Trial (RCT)	Level 1. c
Study 6 Tan *et al*[16]	Randomized Controlled Trial (RCT)	Level 1. c

Source: Adapted to the Joanna Briggs Institute classification of evidence[2].

Table 1 – Assessment of the quality of studies, based on the Critical Appraisal Checklist for RCTs (Barker, *et al*, 2023).

Article	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Result
Study 1 Coria *et al*[11]	No	U	Yes	U	NA	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	67%
Study 2 Chen *et al*[15]	Yes	Yes	Yes	Yes	NA	Yes	U	Yes	Yes	Yes	Yes	Yes	Yes	92%
Study 3 McLeod, *et al*[12]	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	92%
Study 4 Lin *et al*[14]	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Study 5 Tan *et al*[13]	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Study 6 Tan *et al*[16]	Yes	Yes	Yes	Yes	NA	Yes	U	Yes	Yes	Yes	Yes	Yes	Yes	92%

Q – Question; NA – Not applicable; U – Unclear.

Chart 4 – Results found in the systematic literature review.

	Title of article	Authors/year/ country	Participants	Type of Study and level of evidence	Aims	Results/Conclusion
Study 1	Effectiveness of the educational intervention provided by primary health care nurses for users with type 2 diabetes mellitus in promoting metabolic control and achieving long-term therapeutic goals: Randomized controlled trial.	Coria *et al*[11] Year: 2020 Country: Spain	236 patients from a primary health care center in the district of Bahía de Cádiz-La Janda, Andalusia (Spain).	Randomized controlled clinical trial Level 1. c	To evaluate the effectiveness of using a structured, individualized education program for people with type 2 diabetes, provided by a primary care nurse, to manage the health of patients with type 2 diabetes mellitus.	The authors observed a significant reduction in glycated hemoglobin in the intervention group compared to the control group after 12 months. A 0.9% reduction in glycated hemoglobin is associated with a 25% reduction in microvascular complications, a 10% reduction in diabetes-related mortality, and a 6% reduction in all-cause mortality. After 24 months of study, glycated hemoglobin decreased by 0.8%, revealing that participants could benefit from these improvements. For the authors, educational programs can be interpreted as a way to delay the progression of the disease.
Study 2	Effect of a mindfulness program for long-term care facility residents with type 2 diabetes: A cluster randomized controlled trial measuring outcomes of glycemic control, change stress, and depression.	Chen *et al*[15] Year: 2020 Country: Australia	140 participants, in 6 long-term care facilities in Southern Taiwan.	Cluster randomized controlled trial. Level 1. c	To determine the physical, behavioral, and psychosocial effects of a newly developed mindfulness program for older adults with type 2 diabetes relocating to a long-term care facility.	The result showed that the mindfulness program significantly improved HbA1c among residents with baseline values greater than 6.75%. There were more improvements in the mindfulness program group compared to the control group. The authors concluded that residents in the intervention group achieved a 1.1% reduction in HbA1c levels, which suggests significant health benefits. A significant reduction in HbA1c in older adults with diabetes may lead to fewer complications such as retinopathy and other microvascular conditions. The results highlight the benefits of using strategies in the mindfulness program to promote quality care for diabetics living in long-term care facilities.

Chart 4 – Results found in the systematic literature review.

	Title of article	Authors/year/ country	Participants	Type of Study and level of evidence	Aims	Results/Conclusion
Study 3	Impact of a comprehensive digital health program on HbA1c values and weight after 12 months for people with diabetes and prediabetes: a randomized controlled trial.	McLeod, *et al*[12] Year: 2020 Country: New Zealand	429 patients from 25 primary health care centers in the Wellington and Waikato regions of the North Island of New Zealand.	Two-parallel-group superiority randomized controlled trial. Level 1. c	To evaluate the effectiveness of a digital health program (BetaMe/ Melon) versus usual care in improving the control of type 2 diabetes and pre-diabetes in the population, monitored in primary healthcare.	Hba1c in the diabetes group was not different between study arms during follow-up: at the end of 12 months, the average intervention effect was -0.9 mmol/mol. For the prediabetes group there was no clinically important difference between the study arms at 12 months: the mean difference in HbA1c was 0.0 mmol/mol. Weight (analyzed for the combined diabetes and prediabetes groups) reduced slightly in both study arms, but at 12 months there was minimal evidence of an intervention effect (mean difference −0.4 kg).
Study 4	Effects of a symptom management program for patients with type 2 diabetes: implications for evidence-based practice.	Lin *et al*[14] Year: 2019 Country: Taiwan	60 patients from the endocrinology department at a medical center in southern Taiwan.	Simple randomized controlled trial Level 1. c	To examine the effects of a diabetes symptom management program (DSMP) on HbA1c levels, self-care behaviors, quality of life (QL), and symptom severity in clinics with type 2 diabetic clients.	The authors concluded that the decreasing levels of HbA1c from T0 to T2 and from T0 to T3 and the severity of diabetes symptoms from T0 to T2 in the experimental group were significantly better than those in the control group. The increasing levels of self-care behavior and QL from T0 to T1 and from T0 to T2 in the experimental group were significantly greater than those in the control group. Diabetes symptom management program implemented in clinics could improve HbA1c levels, self-care behaviors, quality of life and prevent worsening of diabetes symptom severity in patients with type 2 DM. Diabetes symptom management intervention may benefit patients with type 2 DM in different environments and cultures.

Chart 4 – Results found in the systematic literature review.

	Title of article	Authors/year/country	Participants	Type of Study and level of evidence	Aims	Results/Conclusion
Study 5	Effect of Multidisciplinary Intensive Care on Improving Diabetes Mellitus Outcomes: A Randomized Controlled Pilot Study – the Integrated Diabetes Education, Awareness and Lifestyle Modification Program in Singapore (IDEALS).	Tan *et al*[13] Year: 2019 Country: Singapore	50 users of a diabetes outpatient clinic at a regional hospital in Singapore.	Single Center Randomized Controlled Trial (RCT) Level 1. c	To investigate the impact of multidisciplinary intensive care on the empowerment of patients with diabetes mellitus, compared to routine clinical care.	Multifactorial interventions to control glycemia, blood pressure and LDL have been demonstrated to reduce cardiovascular complications and mortality in people with type 2 diabetes mellitus. Nurse-led outpatient diabetes mellitus management protocols to promote self-monitoring of glycemia and Therapy adjustment training as well as diabetes self-management education programs are effective in increasing knowledge, skills and motivation for self-management of the disease, with associated improvements in outcomes.
Study 6	Effect of a diabetes self-efficacy program in elderly people with type 2 diabetes: a randomized controlled trial.	Tan *et al*[16] Year: 2018 Country: Singapore	113 participants.	A randomized controlled trial with a pre- and post-test control group design Level 1. c	To examine the effect of a newly developed, ethnically sensitive program for patients with type 2 diabetes on self-efficacy, self-care activities, health-related quality of life, glycated hemoglobin (HbA1c), and unplanned use of health services among elderly. with type 2 diabetes in Singapore.	The results included self-efficacy, diabetes self-care activities, health-related quality of life, glycated hemoglobin (HbA1c) and unplanned use of health services. Compared to participants in the control group, those who received the diabetes self-efficacy enhancement program showed significantly increased diabetes self-efficacy and self-care activities, lower HbA1c, and less unplanned use of health services. However, there was no significant difference in health-related quality of life between the two groups. The program increased self-efficacy, which successfully improved self-care activities and reduced HbA1c. There were no reports of diabetes-related hospital admissions by participants in both groups at baseline. Despite this, four participants in the intervention group reported an episode of an...

Chart 4 – Results found in the systematic literature review.

	Title of article	Authors/year/ country	Participants	Type of Study and level of evidence	Aims	Results/Conclusion
Study 6	Effect of a diabetes self-efficacy program in elderly people with type 2 diabetes: a randomized controlled trial.	Tan *et al*[16] Year: 2018 Country: Singapore	113 participants.	A randomized controlled trial with a pre- and post-test control group design Level 1. c	To examine the effect of a newly developed, ethnically sensitive program for patients with type 2 diabetes on self-efficacy, self-care activities, health-related quality of life, glycated hemoglobin (HbA1c), and unplanned use of health services among elderly. with type 2 diabetes in Singapore.	...unplanned consultation related to diabetes, while no participant reported an unplanned consultation in the post-test. For the control group, three participants reported an unplanned diabetes-related visit at baseline, while one participant had an unplanned visit at post-test. In short, the intervention group showed a greater reduction in the frequency of unplanned consultations related to diabetes compared to the control group. The control group also had new cases of diabetes-related visits to the emergency department, while there were no emergency room visits in the intervention group during the 2-month study period.