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SYSTEMATIC REVIEW

Professional training in diabetic foot care: Nursing intervention

Formación profesional en el cuidado de pie diabético: Intervención de Enfermería

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ABSTRACT

Introduction: metabolic diseases are a genetic alteration, specifically of a protein or enzyme that causes a process to be blocked, diabetes is considered a pathology that derives from these, it is characterized by the high concentration of glucose in the blood and that leads to serious damage to the heart, blood vessels, eyes, kidneys, nerves and triggers a diabetic foot.
Objective: to carry out a bibliographic search that provides high-quality evidence regarding professional training in diabetic foot care.
Method: a systematic review was carried out, which followed the guidelines of the PRISMA 2020 declaration, using the PICOT structure for the formulation of the research question. The information search was done through databases such as PubMed, Scielo, Dialnet, RLAE, Scirp, Google Scholar search engine and the virtual library of the Universidad Veracruzana. Using DeCS and MeSH descriptors, articles in Spanish, English and Portuguese were selected, with Boolean operators AND, OR and NOT. Eligibility criteria: experimental and quasi-experimental studies, controlled clinical trials with pre-test and post-test tests, from 2019 to 2024.
Results: 50 investigations were identified, according to the inclusion criteria established, of which 40 were eliminated due to duplication based on screening. For inclusion, 20 articles were considered for reflective reading that allowed an analytical summary, leaving five articles for analysis.
Conclusions: this systematic literature review allowed us to identify, assess, analyze, and synthesize the scientific evidence available with research methodology in the Latin American context, which can serve as references for updating and generating new knowledge.

Keywords: Diabetic Foot; Students; Nursing; Vocational Training; Systematic Review.

RESUMEN

Introducción: las enfermedades metabólicas son una alteración genética, concretamente de una proteína o enzima que hace que un proceso quede bloqueado, la diabetes es considerada una patología que deriva de éstas, se caracteriza por la concentración elevada de glucosa en sangre y que conduce a daños graves en corazón, vasos sanguíneos, ojos, riñones, nervios y desencadena en un pie diabético.
Objetivo: realizar una búsqueda bibliográfica que brinde evidencia de alta calidad en cuanto a la formación profesional en el cuidado de pie diabético.
Método: se llevó a cabo una revisión sistemática, misma que siguió las directrices de la declaración PRISMA

2020, utilizando la estructura PICOT para la formulación de pregunta de investigación. La búsqueda de información se hizo mediante base de datos como PubMed, Scielo, Dialnet, RLAE, Scirp, motor de búsqueda Google Académico y biblioteca virtual de la Universidad Veracruzana. Utilizando descriptores DeCS y MeSH, seleccionado artículos en español, inglés y portugués, con operadores boleanos AND, OR y NOT. Criterios de elegibilidad: estudios experimentales y cuasiexperimentales, ensayos clínicos controlados y con pruebas pre test y post tes con fecha de 2019 a 2024.
Resultados: se identificaron 50 investigaciones, según los criterios de inclusión plasmados de los cuales con base en el cribado se eliminaron 40 por duplicación, para la inclusión se tomaron en cuenta 20 artículos para lectura reflexiva que permitió un resumen analítico, quedando cinco artículos para su análisis.
Conclusiones: la presente revisión sistemática de literatura permitió identificar, valorar, analizar, sintetizar la evidencia científica disponible con metodología de las investigaciones en el contexto latinoamericano, que pueden servir como referentes para la actualización y nueva generación del conocimiento.

Palabras clave: Pie Diabético; Estudiantes; Enfermería; Formación Profesional; Revisión Sistemática.

INTRODUCTION

Metabolic diseases are those that originate from a genetic alteration, specifically of a protein or enzyme, which causes a metabolic process to be blocked. Diabetes is a disease derived from these, characterized by high blood glucose concentrations that can lead to severe damage to the heart, blood vessels, eyes, kidneys, and nerves.[1]

The prevalence of diabetic foot worldwide is worrying, estimated at around 6 %. Amputation is 10 to 20 times more common in people with the disease than in people without it. It is estimated that every 30 seconds, somewhere in the world, someone suffers the amputation of a lower limb.[2]

Diabetic foot can present infection, ulceration, and/or destruction of the podiatric tissues, characterized by one or more wounds that can vary in depth, associated with diabetic neuropathy or peripheral arterial disease. Uncontrolled blood glucose levels cause this complication. Worldwide, this condition varies between 1 % and 4 %, and it is estimated that 15 % to 25 % of people living with diabetes will be affected by a foot ulcer during their lifetime, which may ultimately require amputation.[3]

A report from the hospital epidemiological surveillance system for type 2 diabetes shares statistics showing that 602 cases (5 %) of hospitalized patients were unaware that they had the disease. Among those who were aware, the median diagnosis age was 11 years, and only 56 % received information about the disease in the previous year.[4]

In primary care, there have been reports estimating that 40 % of people with diabetes will develop a new ulcer within a year, 60 % within three years, and 65 % within five years. Alarmingly, one-third of these ulcers will result in limb amputation, making diabetes one of the leading causes of non-traumatic lower limb amputation in Mexico.[5]

Similarly, alarming data on the rate of diabetic foot have been identified in Veracruz, where at least five patients each month undergo total or partial amputation of the lower limb due to complications from diabetes. This is worrying because the condition is occurring at a young age, with amputations performed on people aged around 40.[6]

In Orizaba, Veracruz, the quality of life of people with diabetes was measured, revealing thought-provoking data. Although some users recognize symptoms associated with the disease, they are unable to prevent or warn of complications. Therefore, the multidisciplinary team plays a vital role in the clinical treatment approach, carrying out dependent and independent interventions to improve knowledge and attitudes regarding this situation.[7]

This leads to professional training being a process of acquiring skills specific to the field, developing learning with some degree of complexity, including specific cognitive and psychomotor aspects, as well as socio-affective elements related to each field, generating processes based on the recognition of such education and integrating growth at the curricular level.[8]

The health sector has been identified as an area undergoing significant changes and advances through research. Therefore, nursing staff must receive professional training that enables them to update their skills and provide quality care based on scientific evidence.[9]

Diabetic foot care is a complication that requires the user to be involved in monitoring, based on specific recommendations such as self-care measures ranging from daily hygiene and foot moisturizing, choosing the proper footwear, and visiting a healthcare professional, to prevent ulcers that could develop into complications in the future and lead to foot amputation. Therefore, nursing staff must be well-trained so that they can guide individuals on how to recognize warning signs and act quickly and safely when they appear.[10]

Professional development in healthcare is constantly changing as concepts are reevaluated to improve practice. Clinical simulation is defined as a set of processes led by expert staff for students in nursing and related fields, who have prior knowledge, creating new skills through scenarios that mimic real clinical contexts.[11]

Nursing interventions are defined as those based on scientific knowledge that include strategies, treatments, techniques, complex therapies, or multicomponent programs using technology. They are appropriate, acceptable, effective, safe, efficient, and carefully designed, integrating deliberate cognitive, physical, or verbal activities carried out with individuals and their families to achieve specific therapeutic objectives related to health and well-being.[12]

Therefore, the objective of this research was to conduct a literature search that provides high-quality evidence regarding professional training in diabetic foot care.

METHOD

The systematic literature review was conducted in accordance with the guidelines of the PRISMA 2020 statement (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses),* as it evaluates the effects of health interventions. The PICOT question structure (patient or population, intervention, comparison, outcome, time, type of study) was also used to formulate the research question and define it clearly, ensuring the correct scope. This methodology enabled harmonization with the Cochrane method for searching, classifying, selecting, and analyzing research articles.

Once the methodology was determined, the search for information commenced, which was conducted from February to July 2024. As a result, 50 articles were identified based on the inclusion criteria. According to the screening, 10 duplicates were eliminated, 18 were identified in other sources, and 20 were read in full, excluding 15, leaving five articles for analysis.

To assess the risk of bias, the Robvis web application was used, employing the Excel template with the data matrix, where each of the seven dimensions contained therein was evaluated. 1. Random sequence generation, 2. Allocation concealment, 3. Blinding of participants and personnel, 4. Blinding of outcome assessment, 5. Incomplete outcome data, 6. Selective reporting, 7. Other sources of bias and overall assessment, with the possible results being high, unclear, or low bias. Once this process was completed, the file was uploaded to the platform, obtaining traffic light and bar graphs.[13,14,15,16,17,18,19]

Search strategy

Using the PICOT question, this served as an essential tool for selecting keywords and main search terms, using Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) in English, Spanish, and Portuguese in all possible combinations, as well as truncators (*) and Boolean operators (AND, OR, and NOT) to form specific search algorithms and narrow down the results.[18,19]

Search 1: ((nursing intervention) AND (education)) AND (diabetic foot) Filters: in the last 5 years, Free full text, Clinical Trial, Systematic Review, English, Portuguese, Spanish, Female, Male.

Search 2: (professional training) AND (diabetic foot) AND (nursing) Filters: in the last 10 years, free full text, Clinical Trial, Review, Systematic Review, English, Portuguese, Spanish, Humans, Female, Male, Adult: 19+ years.

Database

Various databases were consulted, mainly open-access ones such as PubMed, Digital, Scielo, Dialnet, RLAE, Scirp, and the virtual library of the Universidad Veracruzana, to obtain full-text documents. Additionally, the Google Scholar search engine was an essential tool for searching across multiple platforms.

Inclusion criteria

For the eligibility criteria, time was taken into account: research articles with a period of no more than five years, beginning in January 2019 and ending in December 2024, developed in any country, but with greater emphasis on Mexico, the United States, Saudi Arabia, Brazil, Cuba, Madrid, and Colombia, in Spanish, English, and Portuguese.

Population: nursing professionals, patients with diabetes mellitus, and university nursing students. Methodology: experimental design research, quasi-experimental, controlled clinical trials, with pre-test and post-test measurements, quantitative approach, original articles, preferably double-masked, reviewed.

Evaluation of studies

This part was carried out using the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement, which was used to conduct this systematic review, documenting information through health interventions.[18]

Bias assessment

For this section, the data collection notebook (CRD) guidelines were used to assess the risk of bias, which were considered adequate according to the method of randomization, concealment, group allocation, homogeneity, lack of knowledge of the researchers, participants, and evaluators of the allocation, and elimination of those that generated a lack of homogeneity. Likewise, the analysis of additional results, beyond those previously mentioned by the authors, along with their intention to treat the information, was carried out using the Rovbis web application to visualize the bias risk assessments.[19]

RESULTS

Figure 1 PRISMA flowchart shows the total number of articles identified (50) based on the inclusion criteria. After screening, 10 duplicates were eliminated, 18 were identified in other sources, and 20 were read in full, excluding 15, leaving five articles for analysis.

After the analysis, five studies were identified that, based on the eligibility criteria and after the screening process, were considered viable.

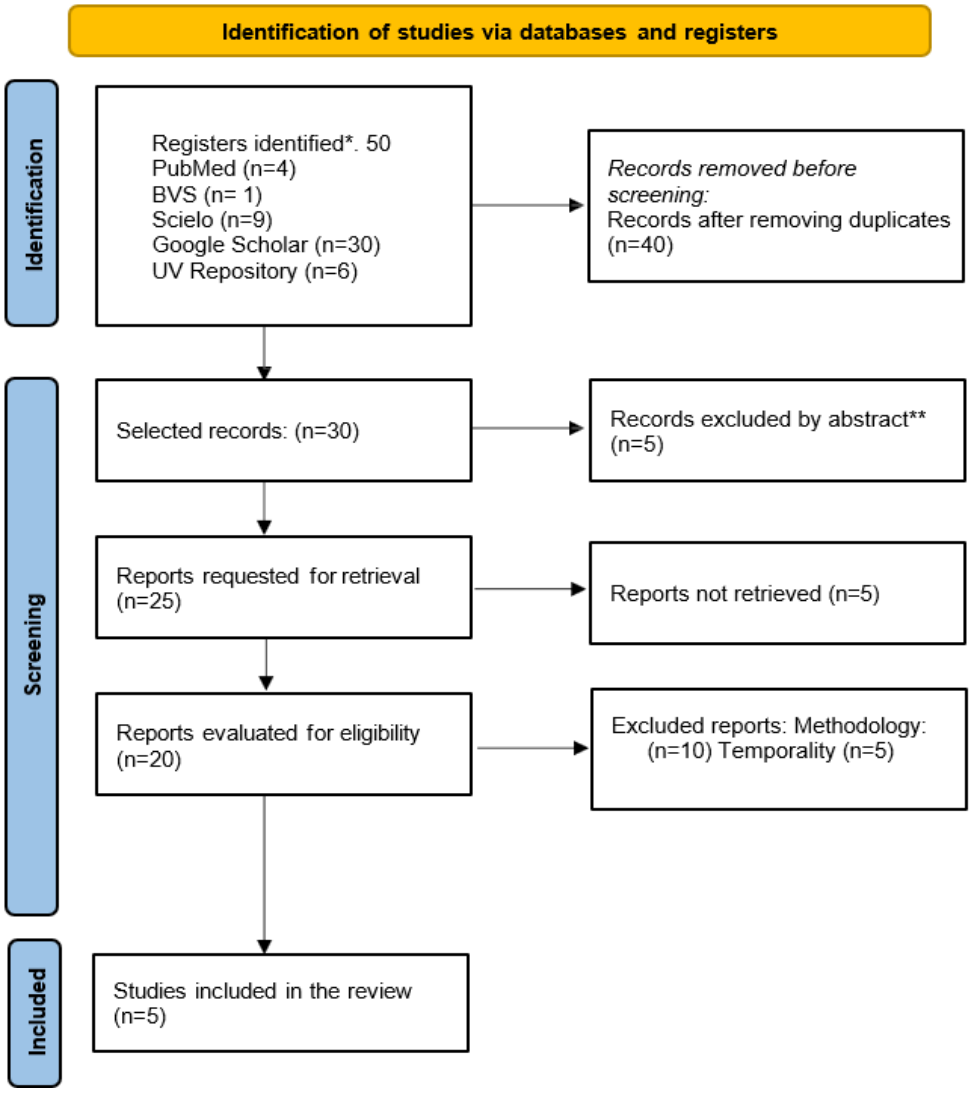

Figure 1. PRISMA flowchart

Note: *Number of records identified in each database or record consulted. **Records excluded by one person, according to the analysis and established criteria

Table 1 shows the general data of the studies. The following information is presented: article title, authors' names, year of publication, country where the study was conducted, keywords, objective, main problem to be solved, methodology used, and level of scientific evidence.

The first article included is entitled "Effect of nursing education intervention on knowledge, attitude, and practice in patients with diabetic foot," conducted in Aguascalientes, Mexico, in 2023, with a level of evidence of three.

An educational intervention on self-care in the prevention of diabetic foot was also identified, developed in Boyacá, Colombia, in 2022, with a level of evidence of III.

In the same vein, the article "Diabetic foot care: a screening of primary care providers' attitudes and practices in Riyah" was developed in Saudi Arabia in 2022, with a level of evidence of three.

Table 1. Selection of studies

N	TIT	APP	PAC	OBJ	PPR	MET	NIE[20]
1	Effect of nursing intervention on knowledge, attitude, and practice in patients with diabetic foot.	Acosta Martínez, 2023. Mexico.[21]	Diabetic foot, educational intervention, knowledge, attitude, and practice.	Evaluate the effect of a nursing education intervention in patients with diabetic foot, through knowledge, attitude, and practice.	Teach users effective strategies to reduce complications in diabetic feet.	Quantitative, applied, preventive, longitudinal, prospective, quasi-experimental study in 25 patients with diabetic foot included on a availability basis, operated on between January and March 2023.	III
2	Educational intervention on self-care in the prevention of diabetic foot	Quemba Mesa, Vega Padilla & Rozo-Ortiz, 2022. Colombia.[22]	Diabetes mellitus, diabetic foot, health education, self-care.	Evaluate the changes in an educational intervention in the prevention of diabetic foot in the self-care level of people with type 2 diabetes mellitus.	Diabetic foot (DF) is a complication that can lead to lower limb amputation, and the risk of developing it	Quantitative study, before and after, with a sample of 79. The pretest measurement included personal and clinical characterization of the individuals and classification into risk category and level of self-care	III
3	Diabetic foot care: a screening on primary care providers' attitudes and practices in Riyah, Saudi Arabia	Alsheikh, AlGhofili, Alageel, Ababtain, Alarify, Alwehaibi, & Altoijry. 2022. Saudi Arabia.[23]	Diabetic foot, diabetic foot disease, diabetic foot ulcer diabetic	To assess knowledge about diabetic foot and the attitude of physicians in primary health care settings toward the diagnosis and prevention of diabetic foot in Riyah , Saudi Arabia	Positive results through a multidisciplinary approach	A cross-sectional observational study used a questionnaire completed by family medicine consultants, residents, and general practitioners	III
4	Education of newly diagnosed diabetic patients to prevent diabetic foot ulcers	García Velázquez, García Rodríguez, Fleites-Fonticiella, Mirabal Rodríguez, Victores Moya & García Rodríguez. 2020. Cuba.[24]	Diabetes mellitus, diabetic foot, patient education as an issue, disease prevention diseases, health promotion	To determine the effect of an educational intervention based on a participatory methodology to increase the level of knowledge and care habits of newly diagnosed diabetic patients.	Education and training to prevent diabetic foot ulcers.	Prospective, applied, and quasi-experimental research conducted from December 2016 to October 2018; an educational intervention was carried out with newly diagnosed diabetic patients organized into groups of 10.	III
5	The effect of operative groups on diabetic foot self-care education: a randomized clinical trial	Baptista Moreira, Sousa Muro, Aparecida Monteiro, Hollanda Lunes, Bacelar Assis, & Lopes Chaves. 2019. Brazil.[25]	Diabetes mellitus, diabetic foot, nursing care, health education, personal care	To evaluate the effect of operative groups on self-care education for the prevention of diabetic foot.	Many patients with diabetes mellitus are unaware of the risk of foot injuries and proper management.	Controlled, blinded clinical trial with volunteers with type 2 diabetes mellitus, randomized into treatment (55 subjects) and control (54 subjects) groups.	II

Note: N: consecutive number, TIT: title, APP: author, year and country, PAC: keywords, OBJ: objective, PPR: problem to be solved, MET: working method, NIE: level of evidence.

The following article, identified as such, focused on the education of newly diagnosed diabetic patients to prevent diabetic foot ulcers, conducted in Santa Clara City, Villa Clara Province, Cuba, with a level of evidence of three.

Finally, we found the study "The effect of operative groups on diabetic foot self-care education: a randomized clinical trial," conducted in Minas Gerais, Brazil, in 2019, with a level of evidence of grade two.

It is essential to note that the five studies analyzed aimed to assess the impact of educational interventions on both nursing professionals and patients, using a quasi-experimental methodology in most articles and achieving a level of evidence of grade three according to the Grove and Gray methodology of 2019.[20]

The Robvis[19] web application is a platform that allows for the assessment of bias risk, providing an Excel template where information from articles must be entered into a data matrix, which evaluates seven dimensions, such as: 1. Random sequence generation, 2. Allocation concealment, 3. Blinding of participants and personnel, 4. Blinding of outcome assessment, 5. Incomplete outcome data, 6. Selective reporting, 7. Other sources of bias and overall assessment, with possible results including high, unclear, or low bias. Once this process is complete, the files are uploaded to the platform, and traffic light and bar charts are generated.

Once the analysis was carried out on the Robvis[19] website, figures 2 and 3 were created, which provided little clarity regarding the blinding of participants and study staff. Effect of Nursing Education Intervention on Knowledge, Attitude, and Practice in Patients with Diabetic Foot. It was identified that in the pre-intervention data, the level of attitude (excellent) and knowledge (excellent) prevailed at 87 % and 83 %, respectively. In turn, the degree of practice (fair) corresponded to 67 %. However, in the post-intervention results, the level of attitude (excellent) and knowledge (excellent) increased to 95 %. In comparison, the degree of practice (fair) increased to 74 % in contrast to the pre-intervention data.

Regarding the data, it was found that the general level of knowledge, attitude, and practice (fair) decreased from 28 % to 4 % after the intervention. At the same time, the overall level of knowledge, attitude, and practice (excellent) increased from 72 % to 96 % after the nursing education intervention. According to the Wilcoxon signed-rank test (p = 0,008), the nursing education intervention, "Standing with Education," modifies the knowledge, attitude, and practice of patients with diabetic foot (table 2).[21]

Figure 2. Traffic light graph of the risk of bias assessment

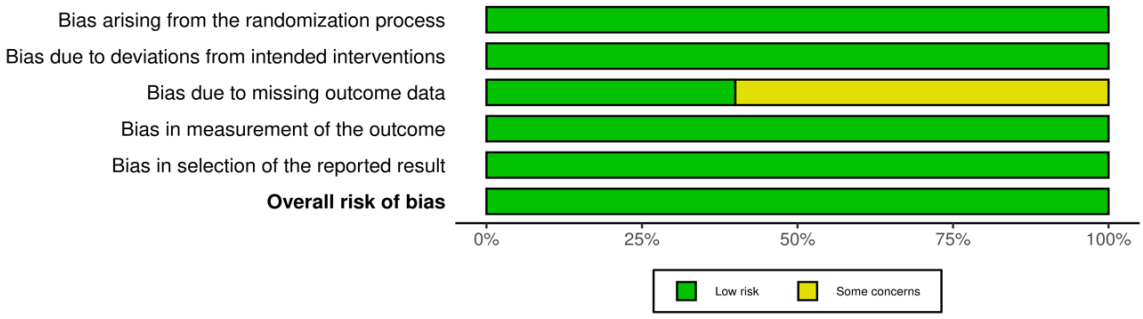

Figure 3. Bar chart of the risk of bias assessment

In the following article, which is an educational intervention on self-care in the prevention of diabetic foot carried out in Colombia, it can be seen that after performing this same intervention in both the pre-test and post-test measurements, participants were classified as having a medium level of self-care, with a difference of 3,63 points (SD = 3,55), =which is statistically significant and shows an improvement in the overall level of

self-care (p = 0,000); specifically in the dimensions of DM self-management (p = 0,000), perception of DP (p = 0,001), emotional impact (p = 0,000), and routine foot care (p = 0,000). The only dimension that did not show significant changes was social support (p = 0,817). Thus, the overall results allow us to accept the alternative hypothesis: the educational intervention does generate changes in the level of self-care in the prevention of PD (H1: p < 0,05).[22]

Similarly, the study "Diabetic foot care: a screening of primary care providers' attitudes and practices in Riyadh, Saudi Arabia" showed the effect of an intervention, where the number of years of practice differed according to training and level (p < 0,001). Less than 50 % (43,4 %) of participants spent more than 10 hours on continuing medical education related to diabetes education during the previous three years (p < 0,001).[23]

The following study, which focuses on educating newly diagnosed diabetic patients to prevent diabetic foot ulcers, was conducted in Cuba. It compared the level of knowledge before and after the intervention on essential aspects that patients need to know to maintain reasonable metabolic control of their disease. The level of knowledge was insufficient in 75,3 % of patients. After the intervention, a high level of understanding was achieved in 55,9 % of patients, and an adequate level was achieved in 38,7 %; the number of patients with a low level of understanding was reduced to 5,4 %. The difference was statistically significant (p < 0,00).[24]

Finally, he studied the effect of operative groups on diabetic foot self-care education: a randomized clinical trial. It was found that the majority of volunteers in the study sample were women, and both genders had low levels of education (p = 0,808). Homogeneity between the groups was also verified in terms of lifestyle variables, including smoking (p = 0,129), alcohol consumption (p = 0,457), and physical activity (p = 0,932).[25]

Table 2. Intervention effects and conclusions

N	TIT	APP	MET	EFI	CON
1	Effect of nursing intervention on knowledge, attitude, and practice in patients with diabetic foot.	Acosta Martínez, 2023. Mexico.[21]	Quantitative, applied, longitudinal, prospective, quasi-experimental study.	According to the Wilcoxon rank test (p = 0,008), nursing education intervention: standing with education, modifies the knowledge, attitude, and practice of patients with diabetic foot.	The study showed that the problem of the increase in the number of diabetic foot cases and their complications lies in practice, as this is the area with the least impact.
2	Educational intervention for self-care in the prevention of diabetic foot.	Quemba Mesa, Vega Padilla & Rozo-Ortiz, 2022. Colombia.[22]	Quantitative, before and after study with a sample of 79 participants. The pretest measurement included the sociodemographic and clinical characterization of the participants, as well as their classification into risk categories and level of self-care.	Significant changes were identified in the level of self-care in the prevention of diabetic foot after the educational intervention (p=0,0000).	The educational intervention implemented showed improvements in the level of self-care in the prevention of diabetic foot. This intervention addressed emotional and social dimensions, diabetes self-management, and foot care.
3	Diabetic foot care: a screening on primary care providers' attitude and practice in Riyah, Saudi Arabia.	Alsheikh, AlGhofili, Alageel, Ababtain, Alarify, Alwehaibi, & Altoijry. 2022. Saudi Arabia.[23]	A cross-sectional observational study used a self-administered questionnaire completed by family medicine consultants, residents, and general practitioners working in primary care settings in Riyadh.	The number of years of practice differed according to their training and level (p< 0,001). Less than 50 % (43,4 %) of participants devoted more than 10 hours of continuing medical education to diabetes education during the last three years (p <0,001).	Physicians had acceptable knowledge of preventive measures. However, deficits were found with regard to diagnosis.
4	Education of newly diagnosed diabetic patients to prevent diabetic foot ulcers.	García Velázquez, García Rodríguez, Fleites-Fonticiella, Mirabal Rodríguez, Victores Moya & García Rodríguez. 2020. Cuba.[24]	Prospective, applied, and quasi-experimental research	Comparison of knowledge levels before and after the intervention on essential aspects that patients need to know to maintain good metabolic control of their disease.	The educational intervention was effective in improving knowledge, weight assessment, metabolic control, and treatment adherence.

				Knowledge levels were insufficient in 75,3 % of patients; after the intervention, a high level of knowledge was achieved in 55,9 % and an adequate level in 38,7 %; the number of patients with low knowledge levels was reduced to 5,4 %. The difference was statistically significant (p=0,00).	
5	The effect of operative groups on diabetic foot self-care education: a randomized clinical trial.	Baptista Moreira, Sousa Muro, Aparecida Monteiro, Hollanda Lunes, Bacelar Assis, & Lopes Chaves. 2019. Brazil.[25]	Controlled, blinded clinical trial with volunteers with type 2 diabetes mellitus, randomized into treatment (55 subjects) and control (54 subjects) groups.	Homogeneity between the groups was also verified in terms of lifestyle variables: smoking (p=0,129), alcohol consumption (p=0,457), and physical activity (p=0,932).	The educational intervention through the operational group was effective, as it promoted self-care and reduced the potential risk of diabetic foot.

Note: N: consecutive number, TIT: title, APP: author, year and country, MET: methodology, EFI: effect of the intervention, CON: conclusions.

DISCUSSION

After reviewing the articles, it was established that there was a significant increase in knowledge about diabetic foot after applying an educational intervention to the experimental groups. In turn, it was found that healthcare personnel had acceptable knowledge about prevention, meaning that nurses and doctors know how to guide the population to avoid complications.

To this end, trained personnel must be identified to implement this approach; hence, the importance of developing educational interventions that will equip healthcare personnel with the knowledge to address the problem of diabetic foot, not only from a curative but also from a preventive perspective.

The article on the effect of a nursing education intervention on knowledge, attitude, and practice in patients with diabetic foot identifies a relationship between the increase in diabetic foot cases and complications, as well as the impact on practice. This is because it is an area of lesser impact, and it was found that the longer this part is carried out, the better the results will be. This is related to knowledge about the condition, meaning that they recognize the need to take care of themselves, but are unsure of how to do so. Therefore, participants were trained to improve these two areas and improve their health status.

To improve the intervention, it was recommended that educational sessions focused on practice be held, given that patients need to implement it properly. Care of the lower extremities is of utmost importance, and nursing is recognized as playing a fundamental role in patient care and education.[21]

Therefore, for research on an educational intervention for self-care in the prevention of diabetic foot, it can be contrasted with the first article, which found improvements in the level of self-care for the prevention of lower limb injuries in people with diabetes, where emotional and social dimensions, self-management of the condition, and foot care were addressed. The same study identified that participants had a high risk of developing diabetic foot, due to their limited prior education on the prevention of this complication.

The research revealed significant changes in the level of self-care in the prevention of DF following the implementation of the educational intervention as a whole, as well as in its four dimensions: self-management of DM, perception of DF, emotional impact, and routine foot care.

This shows that health education can be established as a strong point among health professionals, patients, and caregivers to prevent this complication, keeping in mind that people with diabetes need intervention related to modifiable risk factors (use of footwear, hygiene routines, and lower limb care) and access to comprehensive health education for prevention, aspects that need to be addressed through public health actions aimed at promoting self-care.[22]

The article “Diabetic Foot Care: A Screening of Primary Care Providers, Attitude, and Practice in Riyadh, Saudi Arabia” mentions that the results obtained are fundamental for detecting the state of diabetic foot care, providing adequate knowledge regarding the form of diagnosis.

Most participants expressed that barriers related to knowledge acquisition are the most limiting factors for adequate knowledge. Therefore, similar to other studies, this study notes that access to knowledge is a barrier that can be easily overcome through adequate dissemination of education, generating interventions that will

facilitate improvement in knowledge acquisition. This will enable a comprehensive approach to lower limb complications in people with diabetes through nursing and medical programs.[23]

However, education for newly diagnosed diabetic patients to prevent diabetic foot ulcers showed that health promotion and education are fundamental pillars of comprehensive care. Scientific evidence also indicates that therapeutic education programs with group interventions promote knowledge, allowing patients to adopt positive behaviors and enabling positive changes in care behaviors.

Along the same lines, it was shown that an educational intervention significantly improved lifestyle and knowledge, promoting a culture of glucose self-monitoring, self-care, and lifestyle changes. This allows us to affirm that an intensive approach to the disease, particularly at the onset, can prevent not only micro- and macroangiopathic complications but also the incidence of cardiovascular events.

This research found that an educational intervention based on a participatory methodology was effective in reducing the risk of diabetic foot and in improving the knowledge, weight assessment, metabolic control, treatment adherence, behaviors, and lifestyles of diabetic patients.[24]

The article "The effect of operative groups on diabetic foot self-care education: a randomized clinical trial" discusses that, in a systematic review of educational methodologies for people with diabetes, hypertension, and obesity, preventive educational interventions carried out at the community level are the most efficient, as they are the easiest way to disseminate knowledge while focusing on reducing complications.

In turn, in terms of the risk of diabetic foot, people who participated in the self-care teaching process had lower rates of foot damage after the intervention compared to other people, corroborating what experts have said, where they point out that group health education as an efficient learning strategy can serve as a search for solutions together with professionals to promote knowledge and make practical experience effective.

Identifying that educational interventions on foot self-care through a surgical team demonstrated the potential to improve lower limb self-care in patients with diabetes, contributing to the reduction of foot complications.[25]

CONCLUSIONS

Therefore, this systematic literature review responds to the objective of identifying existing scientific evidence on interventions and research related to training in diabetic foot care over the last five years, allowing for the synthesis, assessment, and evaluation of available evidence about different approaches around the world, returning to data such as article title, author names, year of publication, country where it was developed, keywords, objective, main problem to be solved, methodology used, and level of scientific evidence, as well as the effects of the interventions and conclusions drawn by the authors.

Based on the literature identified, it was observed that there is a limited number of articles that meet the eligibility criteria, as well as research directly related to professional training in diabetic foot care. This leads to the need to propose new strategies that integrate critical components aimed at nursing students and professionals who wish to receive training or refresher courses on this topic.

It is imperative that professionals and students continually update their knowledge and stay current with discoveries, as well as apply what they have learned in practice. For this reason, theoretical models such as Patricia Benner's, which posits that everything learned is improved and perfected over time, should be included.

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