



PHYSIOTHERAPEUTIC CARE STRATEGIES TO IMPROVE QUALITY OF LIFE IN PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY

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Abstract

A systematic review was carried out on the production and publication of research works referring to the study of the variable Physiotherapeutic Care Strategies for the improvement of Quality of Life in patients diagnosed with Diabetic Peripheral Neuropathy, under the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) approach. The purpose of the analysis proposed in the present document was to know the main characteristics of the publications registered in the Scopus and WoS databases during the year and their scope in the study of the proposed variables, achieving the identification of 345 publications. Thanks to this first identification, it was possible to refine the results through the keywords introduced in the search

button of both platforms, which were “PHYSIOTHERAPY” and “QUALITY OF LIFE” and “DIABETIC PERIPHERAL NEUROPATHY” reaching a total of 20 documents, excluding duplicates and those that did not meet the analysis criteria. These were analyzed hoping to know the relationship between both variables, and how the treatment in patients with Diabetic Peripheral Neuropathy can benefit their quality of life, through the strategies designed in physiotherapy. Among the main findings, it was found that the perception of patients suffering from NPD indicates that pain relief is associated with good levels of quality of life and that the application of physiotherapeutic treatments contributes to the reduction of pain, although this does not mean that the diagnosis of the disease changes

Keywords: physiotherapy, quality of life, diabetic peripheral neuropathy, quality of life, diabetic peripheral neuropathy.

1. Introduction

Diabetes is a disease characterized by high blood glucose levels and manifested through various symptoms that can categorize it into Type I Diabetes which is characterized by autoimmune destruction of β -cells, usually leading to absolute insulin deficiency, including latent autoimmune diabetes in adulthood. Type II Diabetes allows for a progressive loss of adequate β -cell insulin secretion, often in the context of insulin resistance. Similarly, there are specific types of diabetes due to other causes, for example, monogenic diabetes syndromes (such as neonatal diabetes and mature-onset juvenile diabetes), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug- or chemical-induced diabetes. diabetes (as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation), as referenced by the American Diabetes Association (2020).

Diabetes has become one of the most frequent health problems in the world population; it is estimated that 8% of the population suffers from this disease, at least in Latin America, and that 50% of these patients have not yet been officially diagnosed by medical personnel (Di Lorenzi *et al.*, 2020). This constitutes a real risk that can affect the quality of life of several tens of thousands of people. Among the complications derived from Diabetes, Gálvez (2021) mentions “Diabetes Mellitus” which mainly threatens the Micro and Macrovascular systems. The first causes complications in smaller caliber arteries that cause neuropathy, retinopathy and nephropathy; diabetic foot: due to neuropathy and microangiopathic affection. And the second can cause permanent damage to arteries of a larger caliber causing cerebrovascular, coronary heart and peripheral vascular diseases (Gálvez, 2021).

According to Ibarra (2015), it is estimated that 69% of patients diagnosed with diabetes mellitus have presented Peripheral Diabetic Neuropathy (PDN) which affects the peripheral nervous system, mainly of sensory type affecting the lower extremities (Quiroz, 2020). To improve the quality of life of patients with this type of symptomatology, physiotherapeutic care strategies have been designed that have largely fulfilled this objective. Improvements have even been demonstrated in areas such as energy and mobility, social burden, sexual function, diabetes control, anxiety and worry (Jimenez, 2017). Therefore, the development of this article is proposed, to carry out a systematic review to establish the current state of the published literature on physiotherapeutic care strategies to improve the quality of life of patients with NPD.

2. General objective

To analyze from a bibliographic perspective, the production of high-impact research papers indexed in the WoS and Scopus databases, on the variables Physiotherapeutic Care and Diabetic Peripheral Neuropathy, from the PRISMA modality.

3. Methodology

The present research is of qualitative type, according to Hernández *et al.*, (2015), qualitative approaches correspond to researches that perform the procedure of obtaining information to review and interpret the results obtained in such studies; for this, it performed the search for information in the Scopus and WoS databases using the words “PHYSIOTHERAPY” and “DIABETIC PERIPHERAL NEUROPATHY”.

3.1 Research design

The research design proposed for the present research was the Systematic Review which involves a set of guidelines to carry out the analysis of the data collected, which are framed in a process that began with the codification until the visualization of theories (Strauss & Corbin, 2016). On the other hand, it is stated that the text corresponds to a descriptive narrative because it is intended to find out how the levels of the variable affect; and systematic because after reviewing the academic material obtained from scientific journals theories on knowledge management were analyzed and interpreted (Hernández *et al.*, 2015).

The results of this search are processed as shown in Figure 1, which expresses the PRISMA technique for the identification of documentary analysis material.

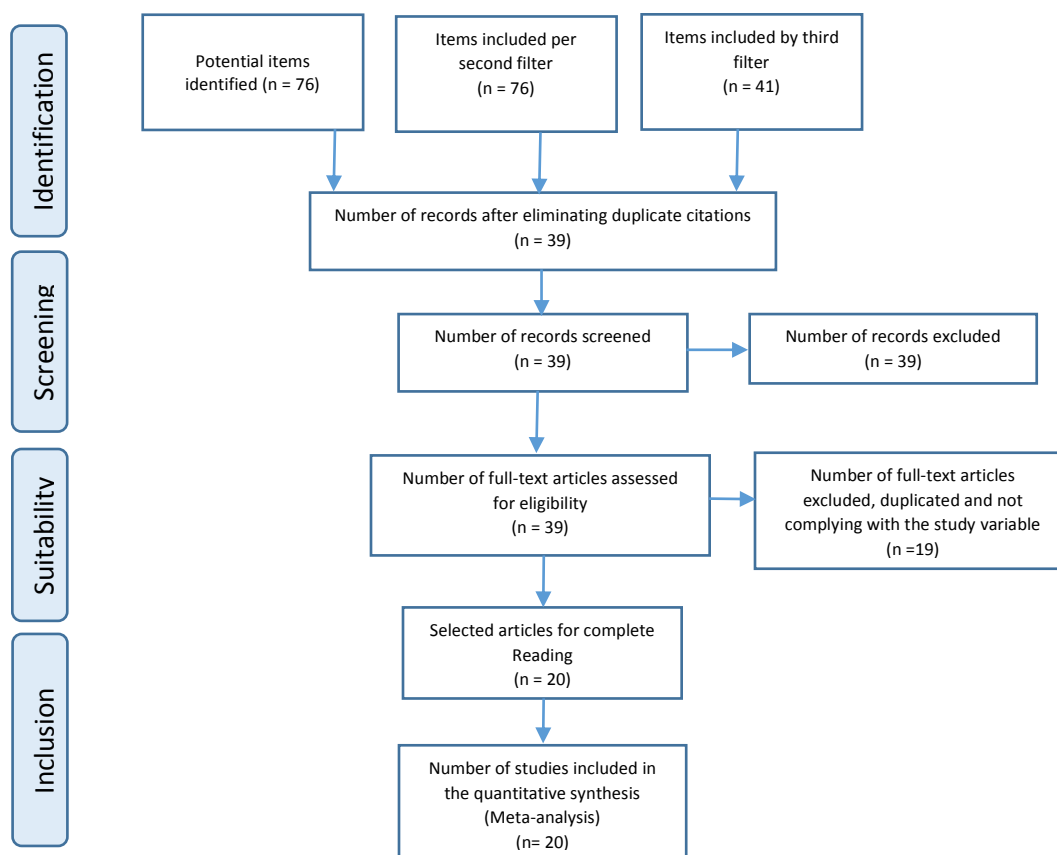


Figure 1. Flowchart of systematic review performed under PRISMA technique (Moher *et al.*, 2009). **Source:** Own elaboration; based on the proposal of the Prisma Group (Moher *et al.* 2009)

4. Results

Table 1 shows the results after applying the search filters related to the methodology proposed for this research, after recognizing the relevance of each of the referenced works.

Nº	TITLE OF THE RESEARCH	AUTHOR/YEAR	COUNTRY	TYPE OF STUDY	INDICATION
1	<i>Feasibility of a home-based foot-ankle exercise program for musculoskeletal dysfunctions in people with diabetes: randomized controlled FOOtCAre (FOCA) Trial II</i>	Silva, É. Q., Santos, D. P., Beteli, R. I., Monteiro, R. L., Ferreira, J. S., Cruvinel-Junior, R. H., ... & Sacco, I. C. (2021)	BRAZIL	QUANTITATIVE	SCOPUS
2	<i>Magnetic resonance neurography findings in three critically ill COVID-19 patients with new onset of extremity peripheral neuropathy</i>	Omar, I., & Garg, A. (2021)	USA	QUALITATIVE	SCOPUS
3	<i>Hand and foot exercises for diabetic peripheral neuropathy: A randomized controlled trial,</i>	Win, M. M. T. M., Fukai, K., Nyunt, H. H., & Linn, K. Z. (2020)	JAPAN, MYANMAR	QUALITATIVE / QUANTITATIVE	SCOPUS
4	<i>Permanent damage of the sciatic nerve in an 8-year-old girl with newly diagnosed type 1 diabetes</i>	Giza, S., Litou, E., Kotanidou, E. P., Kleisarchaki, A. N., Koliatos, P., Tzirtzipis, T., ... & Galli-Tsinopoulou, A. (2020)	GREECE	QUALITATIVE	SCOPUS
5	<i>Effect of Gua Sha therapy on patients with diabetic peripheral neuropathy: A randomized controlled trial</i>	Xie, X., Lu, L., Zhou, X., Zhong, C., Ge, G., Huang, H., ... & Zeng, Y. (2019)	CHINA	QUANTITATIVE	SCOPUS

6	<i>Non-pharmacologic treatments for symptoms of diabetic peripheral neuropathy: a systematic review,</i>	Amato Nesbit, S., Sharma, R., Waldfoegel, J. M., Zhang, A., Bennett, W. L., Yeh, H. C., ... & Dy, S. M. (2019).	USA	QUALITATIVE	SCOPUS
7	<i>Structured exercise program on foot biomechanics & insulin resistance among people living with type 2 diabetes with and without peripheral neuropathy</i>	Kumar, A. S., Hazari, A., Maiya, A. G., Shastry, B. A., Nagiri, S. K., & Vaishali, K. (2019).	RUSSIA	QUANTITATIVE	WOS
8	<i>Effect of photobiomodulation on serum neuron-specific enolase (NSE) among patients with diabetic peripheral neuropathy - A pilot study</i>	Anju, M., Maiya, A. G., Hande, M., & Binu, V. S. (2020).	INDIA	QUALITATIVE	WOS
9	<i>Whole body vibration showed a beneficial effect on pain, balance measures and quality of life in painful diabetic peripheral neuropathy: a randomized controlled trial</i>	Jamal, A., Ahmad, I., Ahamed, N., Azharuddin, M., Alam, F., & Hussain, M. E. (2020).	INDIA	QUANTITATIVE	WOS
10	<i>Community-based study to assess the prevalence of diabetic foot syndrome and associated risk factors among people with diabetes mellitus</i>	Vibha, S. P., Kulkarni, M. M., Kirthinath Ballala, A. B., Kamath, A., & Maiya, G. A. (2018).	INDIA	QUANTITATIVE	WOS
11	<i>Inter-joint coordination during obstacle crossing in people with diabetic neuropathy</i>	Rahimzadeh, S., Ghanavati, T., Pourreza, S., Oskouei, S. T., Zakerkish, M., Kosarian, Z., ... & Mehravar, M. (2020).	IRAN	QUALITATIVE	WOS

12	<i>Classification of the functionality of people with diabetic peripheral neuropathy based on the international classification of functioning, disability and health Core set (ICF-CS) of diabetes mellitus</i>	Fatma, S., & Noohu, M. M. (2020).	INDIA	QUANTITATIVE	WOS
13	<i>Sensorimotor and gait training improves proprioception, nerve function, and muscular activation in patients with diabetic peripheral neuropathy: a randomized control trial</i>	Ahmad, I., Verma, S., Noohu, M. M., Shareef, M. Y., & Hussain, M. E. (2020).	INDIA	QUANTITATIVE	WOS
14	<i>Effect of matrix rhythm therapy in diabetic foot ulcer healing: A case report</i>	Bhatikar, K. (2018).	INDIA	QUALITATIVE	WOS
15	<i>Foot Kinetic and Kinematic Profile in Type 2 Diabetes Mellitus with Peripheral Neuropathy A Hospital-Based Study from South India</i>	Hazari, A., Maiya, A. G., & Shivashankara, K. N. (2018).	INDIA	QUALITATIVE	WOS
16	<i>Effects of Aerobic Exercise on Vibration Perception Threshold in Type 2 Diabetic Peripheral Neuropathy Population Using 3-sites Method: Single-blind Randomized Controlled Trial</i>	Snehil Dixit, M. P. T., Arun Maiya, M. P. T., & Shastry, B. A. (2019).	INDIA	QUANTITATIVE	WOS

17	<i>Effect of sensorimotor training on spatiotemporal parameters of gait among middle and older age adults with diabetic peripheral neuropathy</i>	Ahmad, I., Verma, S., Noohu, M. M., & Hussain, M. E. (2021).	INDIA	QUANTITATIVE /QUALITATIVO	WOS
18	<i>The effects of progressive-resisted exercises on muscle strength and health-related quality of life in persons with HIV-related polyneuropathy in Zimbabwe</i>	Mkandla, K., Myezwa, H., & Musenge, E. (2016).	ZIMBAWE	QUANTITATIVE	WOS
19	<i>Effectiveness of customized insoles on maximum plantar pressure in diabetic foot syndrome: A systematic review</i>	Korada, H., Maiya, A., Rao, S. K., & Hande, M. (2020).	INDIA	QUALITATIVE	WOS
20	<i>Sensory nerve conduction study of median ulnar and radial nerves in type 2 diabetic individuals in the age group 40-80 years</i>	Sepat, P., & Wasnik, S. (2020).	INDIA	QUALITATIVE	WOS

Table 1. List of analyzed articles**Source:** Own elaboration

The 20 documents listed in the table above correspond, as mentioned above, to the search performed in the Scopus and WoS databases, without discriminating by country of origin of the publication or area of knowledge. It is important to note that before the preparation of Table 1, arguments of competence and relevance were taken into account for the subsequent individual analysis of each text.

4.1 Co-occurrence of words

Figure 2 shows the relationship between the keywords used for the search of the study material for the elaboration of the systematic analysis proposed for this research.

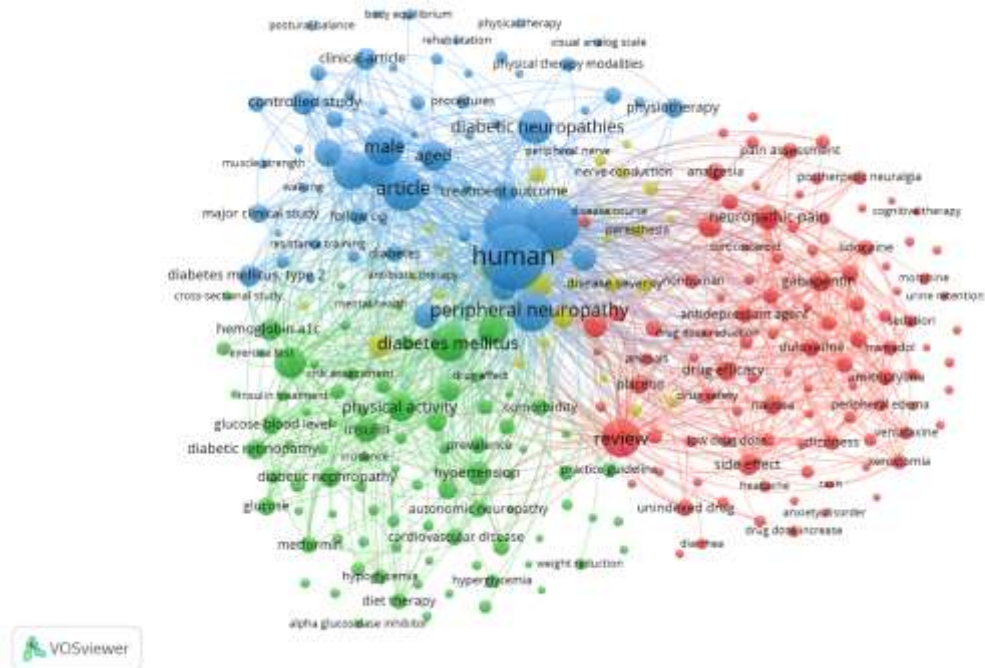


Figure 2. Keyword co-occurrence.

Source: Own elaboration

As shown in Figure 1, the research identified in the first instance, in the search of the databases proposed for the development of this research, shows three main groups of publications that interrelate with each other, based on common theories, led by the keyword HUMAN, as the main axis of the proposed research on the study of quality of life in patients with NPD through physiotherapeutic care strategies. This main group, identified with the color blue, represents the subset of research focused on studying everything related to the disease Diabetic Peripheral Neuropathy, its causes, consequences in men and women, symptoms according to age, the risk factor for the same variable, physical, mental, pharmacological, physiotherapeutic treatments, among others. Case studies, research carried out in specialized clinics and follow-up of recovering patients are recorded in it.

On the other hand, the subset of publications represented by their keywords, with the color green, refer to all the symptoms presented by NPD, and the complications derived from this disease, such as hypertension, hypoglycemia, and internal bleeding, among others. And finally, the research

referenced with the color red, led by the variable REVIEW, shows all the publications that have previously studied the effects of the application of drugs in the treatment of NPD. The supply of analgesics for the control of pain associated with the same, and the adverse effects of the drugs, including the active compounds of the drugs with greater effectiveness in the treatment of this disease are also mentioned. Thus, it is possible to determine the correlation that exists between every one of the researches identified in the databases in their first filter under the variables physiotherapy, quality of life, diabetic peripheral neuropathy, and diabetic peripheral neuropathy.

4.2 Distribution of scientific production by country of origin

Figure 3 shows the distribution of the scientific production identified in the first instance in the proposed databases, related to the study of physiotherapeutic care strategies in the search for improvement in the quality of life in patients with NPD.

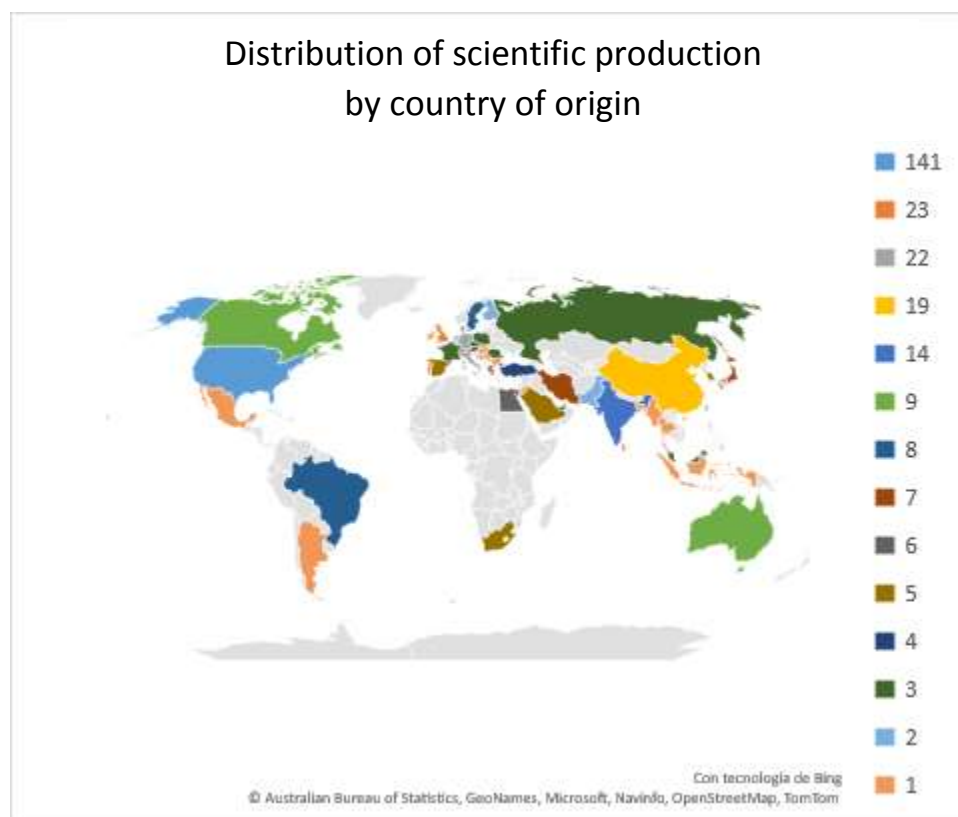


Figure 3. Distribution of scientific production by country of origin
Source: Own elaboration

As mentioned above, Figure 3 shows how the scientific production related to the topic proposed for the development of this research is distributed by each issuing country. Thus, in the first search filter applied, the United States was the country with the largest number of publications with 141, followed by the United Kingdom with 23, Germany and Italy with 22 and China with 19 documents. It should be noted that the volume of production referred to in the previous figure corresponds to the first search result with the variables indicated since the aim was to show the frequency with which countries publish on topics related to NPD and the quality of life of those who suffer from it. Similarly, it is important to mention that, of all the countries registered in this distribution, India was the country with the highest number of publications related to physiotherapeutic care strategies for improving the quality of life in patients with NPD (see Table

1). Finally, the participation of Latin American countries such as Brazil, which published 8 scientific papers, and Argentina together with Mexico, which registered 1 scientific paper, stands out.

4.3 Discussion

The purpose of this article was to analyze from a systematic perspective, the contribution of the authors through their publications, to the study of physiotherapeutic care strategies to improve the quality of life in patients with NPD. Thanks to this, it has been possible to get to analyze the perception and experience of different authors in the framework of treatments applied for the purpose mentioned above, this is how research such as the one entitled “Effect of Gua Sha therapy in patients with diabetic peripheral neuropathy: a randomized controlled trial” (Xie *et al.*, 2019) which bases its study on the practice of Traditional Chinese Medicine, as an alternative strategy in the treatment of NPD. However, it is concluded by its authors, that the treatment applied, called Gua Sha therapy which consists of pressing a lubricated area of the body with a smooth-edged instrument to intentionally create transient red or purple petechiae and ecchymosis, which usually disappear within a few days, presents benefits only in the reduction of pain associated with the symptoms of NPD, but does not represent a cure as such to it. However, Ahmad *et al.* (2021), in their article entitled “Effect of sensorimotor training on spatiotemporal parameters of gait in middle-aged and elderly adults with diabetic peripheral neuropathy”, demonstrated how exercises applied at the muscular level, in the population diagnosed with NPD and with lower limb motor problems, improve the spatiotemporal parameters of gait in adults with diabetic peripheral neuropathy, improve the spatiotemporal parameters of gait after eight weeks in a similar way in middle-aged and elderly patients with DPN, regardless of age through sensorimotor training, which is undoubtedly one of the most significant contributions in improving the quality of life of patients.

Another example of the effectiveness of physiotherapeutic care strategies in improving the quality of life in patients with NPD is shown in the article entitled “Hand and foot exercises for diabetic peripheral neuropathy: A randomized controlled trial” (Win *et al.*, 2020), whose objective was to investigate the effect of 8 weeks of simple hand, finger and foot exercises in patients with diabetic peripheral neuropathy through a study applied to patients diagnosed with such disease in which it was evidenced, at the end of the tests, a significant improvement, developing more strength in the motor score and specific activities of daily living, such as climbing stairs and performing work or household chores. This implies for patients, a fundamental help in mental health, self-esteem, life expectancy, and other aspects that trigger a stronger and real perception of what it is to live with dignity even when they have a diagnosis such as NPD that often ends up affecting the emotional stability of people who suffer from it and even their family. Within this type of applied exercise, we find the one referenced in the article “Effects of aerobic exercise on vibration perception threshold in the population with type 2 diabetic peripheral neuropathy using the 3-site method: single-blind randomized controlled trial” (Snehil *et al.*, 2019), whose purpose was to examine the effects of 8 weeks of moderate-intensity aerobic exercise on vibration perception threshold in type 2 NPD diabetics under the following methodology:

“A total of 87 individuals participated in the study. After final randomization, there were only 47 individuals in the control group and 37 in the study group. Exercise group training was conducted in the range of 40% to 60% of heart rate reserve as a complement to this rating of perceived exertion (scale of 6 to 20) before, during, and after exercise. For the control group, standard medical care, foot care education and diet (same as the experimental group). Both groups were under evaluation at baseline and week 8”.

The study concluded that aerobic exercises significantly increased sensitivity to vibration stimuli in the lower extremities, allowing the initiation of a more advanced study for the strengthening of the lower extremities that will lead to the recovery of full mobility and sensitivity.

5. Conclusions

This review article concludes by highlighting the importance of knowing the updated state of the literature published in databases such as Scopus or WoS, concerning the study of physiotherapeutic care strategies in patients with NPD, since this allows to consolidate a theoretical basis of great relevance in the search for the generation of new knowledge that allows finding new and better alternatives in the treatment of patients who present symptoms associated with this disease, which does not allow the ideal course of their lives.

It is important to mention that within the opinions of the authors cited in the development of this article, it is concluded that although the diagnosis of NPD does not change thanks to the therapeutic treatments applied to patients with this disease, it does improve their quality of life, since in the first instance it has been shown to reduce the pain associated with NPD, which is already a great relief for patients who, without the need to take drugs, can have another option to reduce pain. On the other hand, it helps to recover lost skills such as gait, fine motor skills, and sensitivity, among others, allowing to increase levels of self-esteem, mental health, and emotional balance, which translates into a quality of life for themselves and their families. Therefore, the present study concludes, highlighting the importance of knowing the updated state of the bibliography regarding the study related to the treatments applied to patients diagnosed with NPD, since, from this theoretical basis, it is possible to build and generate new knowledge that allows advancing in the search for the improvement in the quality of life of these patients.

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