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Effectiveness of Physiotherapy in the Improvement of the Perception of Quality of Life in Patients with Hemophilia. A Systematic Review

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Authors' contributions

This work was carried out in collaboration between both authors. Authors RC and MG designed the study, wrote the protocol of this review, and wrote the manuscript. All Authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Background: Hemophilia is a hereditary and chronic disease that mainly affects males. It is characterized by a deficiency in one of the specific clotting factors. The main clinical manifestations of hemophilia are orthopedic, as a result of bleeding in the musculoskeletal system, mainly through bleeding episodes in joints and muscles.
Aim: To assess the effectiveness of treatments of physiotherapy for the improvement in the perception of quality of life in patients with hemophilia A and B.
Methods: This review has been developed a bibliographic search in different databases: PubMed, PEDro, the Virtual Library of health and Isi Web, and in different journals: *Haemophilia*, *Physical Therapy* and *Manual Therapy*.
Results: An analysis of variables was performed and assessed the methodological quality of studies. One study met the criteria for inclusion.
Conclusion: This review shows the small number of studies that evaluate the efficacy of physiotherapy to improve the quality of life of patients with hemophilia. There is no consensus on

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the relationship between the quality of life and clinical characteristics of patients and characteristic features of hemophilia. Clinical trials are needed to demonstrate the effect of physiotherapy in the quality of life of these patients.

Keywords: Haemophilia; arthropathy; quality of life; physiotherapy.

1. INTRODUCTION

Hemophilia is a hereditary chronic disease that primarily affects males, for a recessive disorder of chromosome X. It is characterized by a deficiency in one of the clotting factors, which hinders the normal cessation of bleeding in these patients [1]. There are two types of hemophilia: hemophilia A (where there is a lack of Factor VIII-FVIII) and hemophilia B (deficiency of Factor IX-FIX) [2].

Hemophilia is a disease with a low prevalence that affects approximately 1: 10,000 (hemophilia A) and 1: 60,000 (hemophilia B) [3].

The main clinical manifestations of hemophilia include bleeding in the musculoskeletal system by bleeding into muscles (hematoma) and joints (hemarthrosis) [2]. More than 80% of bleeding in patients with hemophilia are in ankle, knee and elbow [4].

Hemarthrosis appear mainly to trauma, but sometimes they can also be referred spontaneously [5]. The successive development of hemarthrosis in the same joint (target joint) is damaging the joint structures, manifested by severe chronic pain and resulting in clinical symptoms of joint degeneration. These degenerative changes leading to bone loss process and functionality, known as hemophilic arthropathy [6].

The final stage of joint damage is the establishment of a degenerative process known as hemophilic arthropathy. This is manifested by pain, loss of range of movement, muscle atrophy and impaired proprioception. The appearance of the first signs of hemophilic arthropathy is common to occur in the first decades of life, due to the susceptibility of joint cartilage to the damage caused by the iron component of blood [7].

The most effective treatment to prevent the recurrent hemarthrosis and hemophilic arthropathy is the regular administration (prophylactic treatment) of FVIII or FIX concentrates [8].

The progressive joint deterioration that occurs by the development of hemophilic arthropathy, makes it necessary for multidisciplinary approach that includes a medical (prophylactic treatment), surgical (orthopaedic surgery techniques), physiotherapeutic (for functional improvement and delayed functional alterations)and psychosocial (for the effects that this produces functional impairment in psychological, social and labor aspects of these patients) approach [9].

The World Health Organization (WHO) defines physiotherapy as the "art and science of physical treatment of re-education exercise, heat, cold, light, massage and electricity" [10]. Physiotherapy, like other health professions, has been developed in different fields finding a wide range of specialist areas such as neurological physiotherapy, orthopaedic, rheumatology, paediatric or geriatric [11].

Restore the functionality after a hemarthrosis, and maintain range of motion, muscle strength and proprioception in hemophilic arthropathy are two objectives of physiotherapy in hemophilia [12].

Several studies have evaluated the efficacy of different Physiotherapy techniques in the treatment of hemophilic arthropathy observing significant improvements in range of movement (using techniques hydrotherapy) [13], muscle strength and proprioception (home programs with active exercise) [14, 15] and the perception of joint pain (using manual therapy techniques) [16]

The perception of quality of life (QoL) cannot be an independent assessment and goes with the proportion of welfare of a person in relation to his physical condition, emotional state, family, love, social life and the direction that attributed to his life among other things [17]. There are several scales to measure the quality of life in the general population. For patients with diseases have been created specific versions of quality of life scales [18].
For the evaluation of the perceived quality of life in children and adolescents with hemophilia the Haemo-QoL questionnaire [19] was created. It

consists of 8 dimensions (physical function, role physical, bodily pain, general health, vitality, social functioning, and role emotional and mental health). In this questionnaire two different variables are obtained: the QoL depending on physical condition (physical QoL), and depending on psychosocial state (mental QoL).

The QoL may be influenced by factors such as disease and its treatment. In patients with hemophilia, the main factors that negatively influence the perception of QoL are restrictions on physical activities, concern about bleeding, development of hemophilic arthropathy, the need to perform orthopaedic surgical procedures and fear of transmission of infectious diseases [20].

The main objective of this work is to learn from the existing literature about the effectiveness of physiotherapy treatments for improving the perceived quality of life in patients with hemophilia. Other objectives are: to identify the techniques that produce more improvement in quality of life; and observe the influence of hemarthrosis and hemophilic arthropathy in the quality of life of patients with hemophilia.

2. MATERIALS AND METHODS

2.1 Design of the study

Systematic review, conducted between October and November 2013, with a last update in April 2014.

2.2 Documentary Sources

We have developed a literature search in different databases in order to identify all articles that describe physiotherapy intervention, using as dependent variable the perception of quality of life in patients with hemophilia.

The databases consulted were: PubMed, PEDro, the Biblioteca Virtual de Salud (BVS) and Isi Web of Knowledge. Similarly, we conducted a search in three journals: *Haemophilia, Physical Therapy* and *Manual Therapy*.

2.3 Search Strategy

The medical subjects heading included “hemophilia” AND “quality of life” AND “physical therapy” OR “physiotherapy” OR “rehabilitation” in the article, and specialised electronic magazines were consulted: *Haemophilia, Physical Therapy* and *Manual Therapy*. Two authors reviewed the abstracts and full texts of the studies found in the databases and journals, and if in doubt, the eligibility of any of the articles were determined by consensus.

2.4 Criteria for Selection of Articles

The studies selected met the following criteria: (I) articles that assess patients with hemophilia A or B, and different degrees of severity (severe, moderate, mild); (II) the articles must be published; (III) they use physical therapy treatments; (IV) they include at least one treatment group with pre-test and post-test evaluations; (V) and the size of the sample in the post-test is a minimum of five individuals per group.

The articles were excluded who: (I) case studies, descriptive articles or systematic reviews; (II) articles with patients with other congenital coagulopathies (e.g. Von Willebrand disease); (III) studies in which the methodology of physiotherapy treatment and measures of evaluation used is not detailed; (IV) abstract or communications to Congress; (V) and studies of Physiotherapy after surgery where no detail physiotherapy treatment protocol employed.

We did not put any time limit on the date of publication of the articles: the study had to have been published prior to April 2014. Likewise the studies included are restricted to those in Spanish, French, English, Italian, and Portuguese.

2.5 Qualitative Analysis of the Level of Scientific Evidence

To evaluate the methodological quality of the studies, we used the Van Tulder et al. [21] and PEDro [22] scale.
After making the different search strategies described earlier in the databases and journals indicated, 1096 articles were obtained. Only one of these articles [23] met all the inclusion criteria. Fig. 1 shows the flow chart of the search performed.

3. RESULTS

The search of electronic databases and specialised electronic journals provided 81 articles. We reviewed the abstracts and finally, only 1 study met all inclusion criteria. After the search, only 81 articles were preselected, but only one carried out an physiotherapy treatment

with an experimental group and a control group, and the pre and post evaluation assessed the perceived quality of life of patients in both groups.

Therefore, the methodology and the level of scientific evidence analysis of this review focused on the study of von Mackensen et al. [23], who conducted a physiotherapy treatment in an aquatic medium using joint mobilization techniques, stretching exercises, joint stability, and gait training and posture in patients with hemophilia.

Table 1 shows the main sample and methodological characteristics of the selected study.

3.1 Characteristics of the Selected Article

3.1.1 Type of study

The study that met the inclusion criteria [23] was a nonrandomized, prospective and longitudinal clinical study.

3.1.2 Sample

The number of patients who started the study was 28: 13 were assigned to the experimental group (EG) and 15 to the control group (CG). Patients were recruited from two hospitals in Hamburg and were assigned to each group according to their availability. The mean age

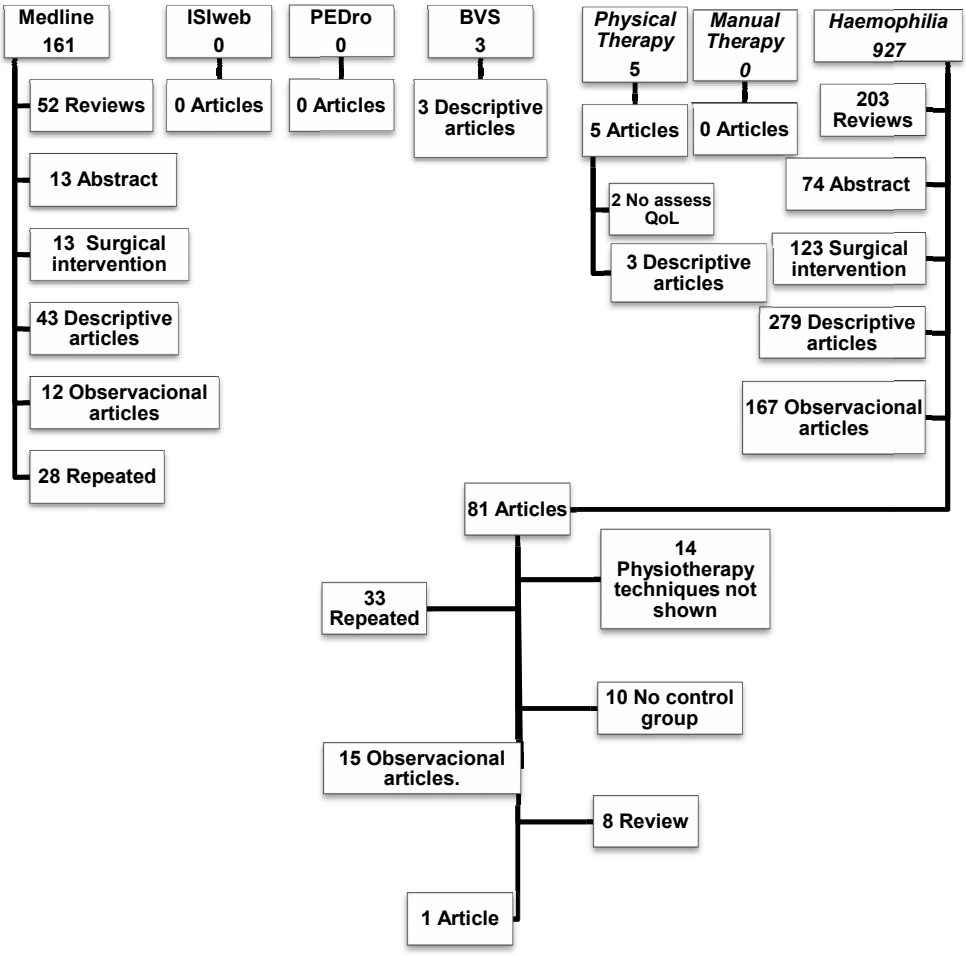

Fig. 1. Flow diagram of the search

of the 28 patients at baseline was 40.68 years (SD: 12.7, range 22-64), with no significant differences between groups (GE: 42.54 years, GC: 39.07 years).

The majority of patients (78.5%) had a medical diagnosis of hemophilia A and 64.2% had a viral infection as a result of pharmacological therapy. Just the 28.5% of patients were on prophylaxis at baseline, while none of them had antibodies to FVIII / FIX (inhibitors).

92.8% of subjects were administered pharmacological treatment in their own home (self-treatment) and just over half of them (53.5%) already had a target joint. Of the 28 patients who started the study, only 21 were subjected to post treatment evaluation. For various reasons 7 patients dropped out (4 in the experimental group and 3 in the control group).

3.1.3 Intervention

This study was conducted over a period of 12 months and no follow up assessment was performed. The treatment applied to patients enrolled in the experimental group consisted of exercises which contained mobilizations and strengthening the full range of joint movement. According to conditions of patients with haemophilia during 12 months of treatment, the exercise program was modified and adjusted. Devices were used to increase strength and be more effective in the training of muscle strength, such as weights of water and pool tables.

Each exercise was carried out with 20 repetitions, which would be less in the case of muscle fatigue appeared by training.

3.1.4 Measuring instruments

Before beginning treatment, at 6 months and after the end of the same, assessed 3 main dependent variables: physical performance, the orthopaedic status and perceived quality of life of patients. For measuring the QoL the measuring instruments used in this study were as SF-36 and Haem-A-QoL questionnaires.

The SF-36 [24] is the generic questionnaire most widely used in the assessment of perceived quality of life. This scale consists of 36 items that assess physical function, restriction of activities related to physical problems, pain, vitality, general health perception, social relations and activity restriction.

The Haemo-QoL-A [25] questionnaire was designed to assess the perceived quality of life in adult patients with hemophilia. It consists of 46 items comprising 10 dimensions (physical health, feelings, vision, sports and leisure, work and school, boarding, processing, future, family planning, and relationship / couples).

3.1.5 Results

At 6 months of starting the study and after the period of treatment of 12 months, the paper's authors evaluated the different variables of the study, finding improvement in orthopaedic joint health. No significant differences in quality of life between the patients in both groups were observed. There was also no improvement in quality of life in the patients of experimental group after the treatment period. This lack of variations in the QoL was observed in subjects in both groups, regardless of the analyzed questionnaire.

3.2 Qualitative Analysis of the Level of Scientific Evidence

In both scales the result was 3 points. This score is small, mainly because of the lack of randomization of study subjects to experimental and control groups. Similarly, the non-realization of an intention to treat analysis and no blinding of assessors or patients decreases the score.

The homogeneity at baseline between the experimental and control groups, the development of inclusion and exclusion criteria for recruitment of patients, and the validity of the outcome measures used in the pre and post assessment of the dependent variables, are the items that justify this score.

In terms of qualitative analysis of the level of scientific evidence, the results of the analysis with the Van Tulder and PEDro scales are detailed in Tables 2 and 3.

3.3 Quantitative Analysis of the Selected Article

3.2.1 Variables of treatment and of the patients

The total study duration was 12 months with an intensity of 1 hour a week and a magnitude of the treatment applied to patients in the experimental group 12 hours.

Table 1. Characteristics of the article selected in this review

Article	Type	R	Nexp	Ncont	Age	D	Treatment	F	Variables	Measuring instruments	Results
Von Mackensen et al. 2012 [23]	Clinical prospective longitudinal study	NO	N_{pre}:13 N_{post}: 9	N_{pre}:15 N_{post}: 12	EG: 42.54±13.5 CG: 39.07±12.3	48	-Joint mobilization techniques. -Muscle stretching exercises. -Training of joint stability. -Training of gait and posture.	NO	- Quality of life. -Physical performance. - Status orthopedic joint.	-SF-36. -HaemoQoL. -HEP-Test-Q. -OJS.	No significant differences in QoL

Type: tye of article; R: randomization; Nexp: number of patients in experimental group; Ncont: number of patients in control group; Npre: number of patients at baseline; Npost: number of patients at the end of treatment; EG: experimental group; CG: control group; D: duration of the treatment (weeks); Treatment: Treatment of Physiotherapy; F: Follow up period

Table 2. Analysis of the methodological quality of Von Mackensen et al. [23] study, by Van Tulder scale

Ítems	Von Mackensen et al. [23]
Was the method of randomization adequate?	NO
Was the treatment allocation concealed?	NO
Were the groups similar at baseline regarding the most important prognostic indicators?	YES
Was the patient blinded to the intervention?	NO
Was the care provider blinded to the intervention?	NO
Was the outcome assessor blinded to the intervention?	NO
Were co-interventions avoided or similar?	NS
Was the compliance acceptable in all groups?	NO
Was the drop-out rate described and acceptable?	YES
Was the timing of the outcome assessment in all groups similar?	YES
Did the analysis include an intention-to-treat analysis?	NO

Table 3. Analysis of the methodological quality of Von Mackensen et al. [23] study, by PEDro scale

Items	von Mackensen et al. [23]
Eligibility criteria were specified	1
Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	0
Allocation was concealed	0
The groups were similar at baseline regarding the most important prognostic indicators	1
There was blinding of all subjects	0
There was blinding of all therapists who administered the therapy	0
There was blinding of all assessors who measured at least one key outcome	0
Measures of at least one key outcome were obtained from more than 85% of the Subjects initially allocated to groups	0
All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by “intention to treat”	0
The results of between-group statistical comparison s are reported for at least one key outcome	1
The study provides both point measures and measures of variability for at least one key outcome	1

3.2.2 Methodological variables

The sample size of the experimental group at baseline was 13 patients, and at the end of treatment of 9 patients with hemophilia. In the control group, of the 15 patients recruited 12 were assessed in the evaluation after the study period of 12 months. The differential mortality after treatment period was 25% (7/28), being 30.7% in the experimental group and 20% in the control group.

3.4 Assessment of Descriptive Studies

Eight observational studies that evaluated the quality of life and different physical variables were analyzed. Table 4 shows the most important characteristics indicated respect of the samples analyzed in the same, the measurements and the results described. In the studies analyzed 975 patients with hemophilia were enrolled with a great variability of sample size.

4 articles [18,26,27,28) used between 20 and 96 subjects, in 3 [1,29,30] the sample was over 100 patients, and in only 1 article [31] the sample size was less 13.

The analyzed studies evaluated patients with different age ranges. More than half of the articles choose a range of young ages, between childhood and adolescence (4 yrs - 26 yrs), six articles recruited patients with a wider range of age (2 yrs - 65 yrs), and only one study does the analysis in patients of all kinds of ages with a range from 7 months to 81 years.

All of them measure the quality of life as well as other physical variables such as postural balance, muscle and joint status and the perception of pain. The most commonly used for assessing the perception of QoL are the SF-36 and HaemoQoL questionnaires. Although some authors [1,29,30,32] also use other tools for measure this variables (SF-12, EQ-5D, PedsQL40 and HAQ).

Finally, the analysis of the 8 descriptive studies [1,18,26-31] which we have made in this review is detailed in Table 4.

4. DISCUSSION

Recurrent hemarthrosis cause degenerative joint injuries. These lesions (hemophilic arthropathy) cause joint pain, stiffness and limited range of motion [33]. These sequelae restrict the functionality and affect the physical and psychological well-being of the patients. This impairment may also affect their quality of life [34].

4.1 Assessment of Quality of Life

In the last decades multiple self-administered questionnaires have been developed for the assessment of different psychological variables. Quality of life is one of the variables where more scales have been developed [35,36].

The SF-36 questionnaire has been used in the measurement of the quality of life of patients after total knee replacement [37], rheumatoid arthritis [38] and ankylosing spondylitis [39]. It has also been used in patients with hemophilia [40-42]. With these patients, this questionnaire has identified a worse quality of life compared with the general population and an inverse relationship with the age of the patient.

In a recent study, Dolatkhah et al. [43] reported better physical functioning and better quality of life in adult patients who had always received prophylactic treatment, compared to patients on demand. Fischer et al. [44] observed as the degree of hemophilic arthropathy, measured with the Pettersson´s scale [45], is associated with a lower score of the "physical function" domain in SF-36 questionnaire.

Molho et al. [46] observed a direct relationship between age of patients with hemophilia and its treatment (surgery, home treatment, prophylaxis), with the perception of quality of life. A European Studio with 903 patients with hemophilia, led by Royal et al. [40] highlighted that patients with prophylactic treatment had more scores in physical functioning, bodily pain, general health, social functioning and mental health domains.

4.2 Quality of Life and Exercise

Swimming is the sport most recommended in patients with hemophilia [47]. However, there are little clinical studies where patients with hemophilia have developed swimming programs [23,48-50]. Vallejo et al. [49] found improvement in mechanical and aerobic capacity of 13 patients with hemophilia after 9 weeks of treatment. Meanwhile García et al. [50] observed improvement in range of motion after a hydrotherapy treatment with patients with hemophilic arthropathy.

The sport activity is not described as part of the multidisciplinary treatment of hemophilia [51] although have been described the physical and psychosocial benefits of sport in patients with hemophilia [52-54].

In the study by Von Mackensen et al. [23], they did not find significant differences, patients reported an improved quality of life during treatment.

Seuser et al. [55] reported physical and emotional benefits of sport, provided that prior to treatment has been made an adequate physical evaluation and correct preparation. Also von Mackensen et al. [56] observed correlation between quality of life and physical performance in 33 adult patients with hemophilia. Therefore, they recommended supervised training programs to improve physical condition and quality of life for patients with hemophilia.

Table 4. Analysis of observational studies found in the review

Article	Type	N	Duration	Age	Variables	Measuring instruments	Results
Solovieva 2001 [41]	Observacional study	150	36	43±15 (range:16-73)	-Bleeding frequency -Physical activity -Pain -Disability -QoL	-HAQ score -SF-36 questionnaire -VAS scale	-QoI worse depending on the age and the severity of haemophilia
Tusell et al. 2002 [18]	Observacional study	70	12	29.6 (range: 16-26)	-QoL -Physical activity -Radiological joint deterioration	-SF-36 questionnaire -Gilbert score -Pettersson score	-Patients with hemophilia have worse QoL than healthy controls, regardless of pharmaceutical expenditure and of the treatment regimen.
Fischer et al. 2005 [44]	Observacional study	96		28,6±11.5 (range: 13-54)	-QoL -Radiological joint deterioration	-SF-36 questionnaire -Pettersson score	-The greater the age and radiological joint deterioration, worse QoL (especially in physical function).
Van der Net et al. 2006 [29]	Observacional study	13	4	11.04±2.45 (range: 8-14)	-QoL -Max O2 Consumption -Physical activity - Jointstatus	-HaemoQoL questionnaire -VO_2pico -ASK assessment -HJHS score	-Children with severe hemophilia A without joint damage, have a similar QoL to that of healthy subjects. - The greater the age, the better the perception of QoL -Correlation between the QoL of parents and children
M. Morfini et al. 2007 [30]	Observacional study	128	17	42.6 (range: 14-61)	-Pain -Physical state -Radiological joint deterioration -QoL	-VAS scale -Gilbert score -Pettersson score -EQ-5D score	-Patients with hemophilia and inhibitor have worse QoL than patients without antibodies.
Poon et al. 2012 [34]	Observacional study	329	24	33.5±12.6 (range: 2-64)	-QoL -Limitation and joint pain -Range of movement	-SF-12 questionnaire -PedsQL40 questionnaire -Goniometry - Likert scale (pain, movement)	-In patients with severe hemophilia, there are more pain and physical limitations, and worse QoL. -Children and adults with moderate and mild hemophilia, with a similar QoL to healthy controls -Worse QoL according to the severity of haemophilia

Article	Type	N	Duration	Age	Variables	Measuring instruments	Results
Lindvall et al. 2012 [27]	Observacional study	105	60	42.8±16.1 (range: 18-84)	-QoL -Pain	-SF-36 questionnaire -VAS scale	-The greater the age, worse QoL. - Better QoL in patients undergoing orthopedic surgery - In patients with severe hemophilia, the better the QoL after a period of five years
Khair et al.2012 [28]	Estudioobservacional	84	NS	11.52±3.4 (range: 6-18)	-QoL -Rendimiento físico -Physicalactivity	-HaemoQoL questionnaire -KINDL scale -HEP-Q score	-There are better QoL in children who play sports.

Type: type of article; N: number of patients in the study; Duration: duration of the study (weeks)

Miners et al. [57] conducted a study with 70 patients with severe haemophilia A, noting that age was a predictive variable for quality of life. However, surgery and HIV infection were not associated with quality of life. These results, together with those reported by Fischer et al. [44] coincide in indicating age as a main determinant of the quality of life.

In the study of Von Mackensen et al. [23] the average age of the 25 patients with hemophilia who completed the study was 40.6 years. The perceived quality of half-life was 88.06 points (measured with the SF-36 questionnaire) and 33.79 points (questionnaire Haemo-QoL-A). These values of quality of life are slightly lower than the normative values of quality of life in the German population [58].

4.3 Limitations of the Study

We found significant limitations in this review. The most important limitation is the number of articles that we could evaluate.

The number of studies that evaluate the efficacy of physiotherapy in patients with hemophilia is very low. If among the study variables we include quality of life, only one article meets the selection criteria.

The heterogeneity of the questionnaires used to assess the quality of life complicates the comparison and analysis of this variable.

4.4 Relevance of the Study for Clinical Practice

Although the results of our review are not those expected, different lines of work can be taken into account

It is necessary to carry out randomized clinical trials to demonstrate the efficacy of physical therapy and its relationship to quality of life in patients with hemophilia

The assessment of the quality of life before and after physiotherapy treatment will help perform a multidisciplinary treatment.

According to analyzed descriptive studies, physiotherapy is important in the treatment of hemophilic arthropathy and hemarthrosis. According to the progress of these bleedings, we can improve the quality of life of patients with hemophilia.

4.5 Future Lines of Research

Future studies should evaluate the effectiveness of physiotherapy in the quality of life of patients with hemophilia. For this, authors should take particular account of the methodology. It is necessary to carry out well-designed randomized clinical trials, to provide us with information about what treatment techniques significantly influence the perception of QoL.

Similarly, the use of properly validated outcome measures, detailed programs of Physiotherapy and a methodology that includes at least assessor blinding, the homogeneity among of study groups, an analysis by intention to treat and follow-up periods would help to counteract the predictable low sample size, due to the low prevalence of hemophilia.

The study of von Mackensen et al. [23] has conducted a complete physiotherapy treatment. It would be necessary to conduct a randomized clinical trial, with the same program, but with more duration, to ratify the physical improvements obtained. Also would help to confirm the efficacy of this therapeutic tool with respect to the quality of life for patients with hemophilia.

Finally, it would be appropriate to apply physiotherapy techniques that have proven effective regarding physical variables most affected in patients with hemophilia. The treatment of pain and deficit of the range of movement, muscle strength and proprioception in patients with hemophilia has been studied in several studies, using techniques of hydrotherapy [50], electrotherapy [59], or strength exercises against resistance [60]. It would be interesting in future studies to assess the relationship of these techniques to the perception of QoL of patients, thereby to increase the scientific evidence between Physiotherapy and quality of life of patients with hemophilia.

5. CONCLUSION

This review reveals the limited number of scientific articles that assess the effectiveness of a physiotherapy treatment to improve the perception of quality of life in patients with hemophilia.

A treatment of joint mobilization techniques, stretching exercises, joint stability training, gait training and the posture of 12 weeks, does not significantly improve the perceived quality of life for patients with hemophilia, although obtained improved orthopaedic joint health.

There is no consensus in the literature regarding the quality of life of patients with hemophilia and their characteristics (age, type and severity of hemophilia, treatment type, etc.).

Randomized clinical trials are needed to demonstrate how Physiotherapy treatments are effective in improving the perceived quality of life of patients with hemophilia.

6. DISCLOSURES

The authors stated that they had no interests which might be perceived as posing a conflict or bias.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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