

Role of physical therapy modalities in management of pain in children with hemophilia: systematic review

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Abstract

Objective:To investigate the role of physical therapy modalities in management of pain in children with hemophilia:

Data sources:This research was identified by searching the following databases pub Med,PEDro,web of science,Cochrane and Google scholar to identify RCT that investigated the Role of physical therapy modalities in management of pain in children with hemophilia.

Study selection: Searching identified 917eligible articles evaluate studies published from inception to 2018. Studies were included if they were applied on hemophilic children, written in English, RCT. four studies met the inclusion criteria .

Data extraction: Methodological quality of trials was assessed independently by 2 reviewers. who extracted data (study name , design, subjects, intervention, key outcomes results), applied the (PEDro) scale to assess the method quality of selected studies, and determined the strength of the evidence using modified sackett score potential studies.

Data synthesis:four studies met the inclusion criteria. PEDro scale values ranged from 4 to 7. The primary outcome was pain while the secondary outcomes were balance, function capacity, gait ,ROM, swelling, muscle strength ,and mobility.The included articles are RCT which investigated a total of 130 subjects, the age of the participants ranged from 9-16 years. The duration of the intervention ranged from 6 to 12 weeks.

Conclusions:There is evidence to suggest that physical therapy modalities are effective in control pain in children with hemophilia.

Key words:arthropathy; bleeding; hemophilia; physical therapy modalities; pain; hemoarthrosis.

Introduction

Hemophilia is an inherited X-chromosomal recessive disorder caused by deficiency or dysfunction of coagulation factor VIII (hemophilia A) or factor IX (hemophilia B), which results in decreased and delayed generation of thrombin, giving rise to defects in clot formation that lead to hemorrhagic diathesis^[1]. Hemophilia may be labeled as severe (<1% of normal), moderate (1–4%) or mild (5–25%)^[2]. Acute and chronic pain are common in patients with hemophilia, adequate assessment of the cause of pain is essential to guide proper management^[3]. Recurrent joint bleeds are the hallmark of severe hemophilia and may result in hemophilic arthropathy^[4]. The most affected joints are the elbows, knees and ankles^[5]. This study added to the body of knowledge the role of physical therapy modalities on pain management in children with hemophilia.

Subject, materials and methods

A-Research question: This systematic review aimed to answer the following question do physiotherapy modalities play role in management of pain in children with hemophilia?

The PICO: P=children with hemophilic joint pain; I= different physical therapy modalities; C= (1) comparison between the effect of different physical therapy modalities; O= pain, muscular strength, balance, function capacity, gait, mobility, ROM, swelling and physical fitness.

B-Search strategy: This research was identified by searching the following databases pub Med, Pedro, web of

science, Cochrane and Google scholar to identify randomized controlled trials that investigated the role of physical therapy modalities in management of pain in children with hemophilia as shown in PRISMA flow diagram.

C-Selection criteria: Titles and abstracts were initially reviewed by one of the authors and any potentially eligible titles were identified. Full-text manuscripts were independently examined for eligibility by two authors. If consensus could not be reached, agreement was obtained through discussions with a third person. Studies were included if they met the following criteria: (1) the primary aim was to examine the effect of physical therapy modalities in pain management in children with hemophilia; (2) age ranged from (2-18) years; (3) the results focused on pain; and (4) articles written in English; (5) RCT. Studies were excluded if: (1) outcomes not related to pain; (2) any intervention not related to physical therapy modalities; (3) case control study.

D-Study selection: The initial literature searches of electronic databases resulted in a total of 917 potentially relevant records. Removal of duplicates within and between the individual databases left 879 articles for further examination. Manual screening of the reference lists of these potentially eligible trials did not generate any additional results.

One researcher independently screened all titles and abstracts to identify potentially relevant articles result in 46 articles, which were obtained in full text and assessed according to the selection criteria by two reviewers. As shown in PRISMA flow diagram.

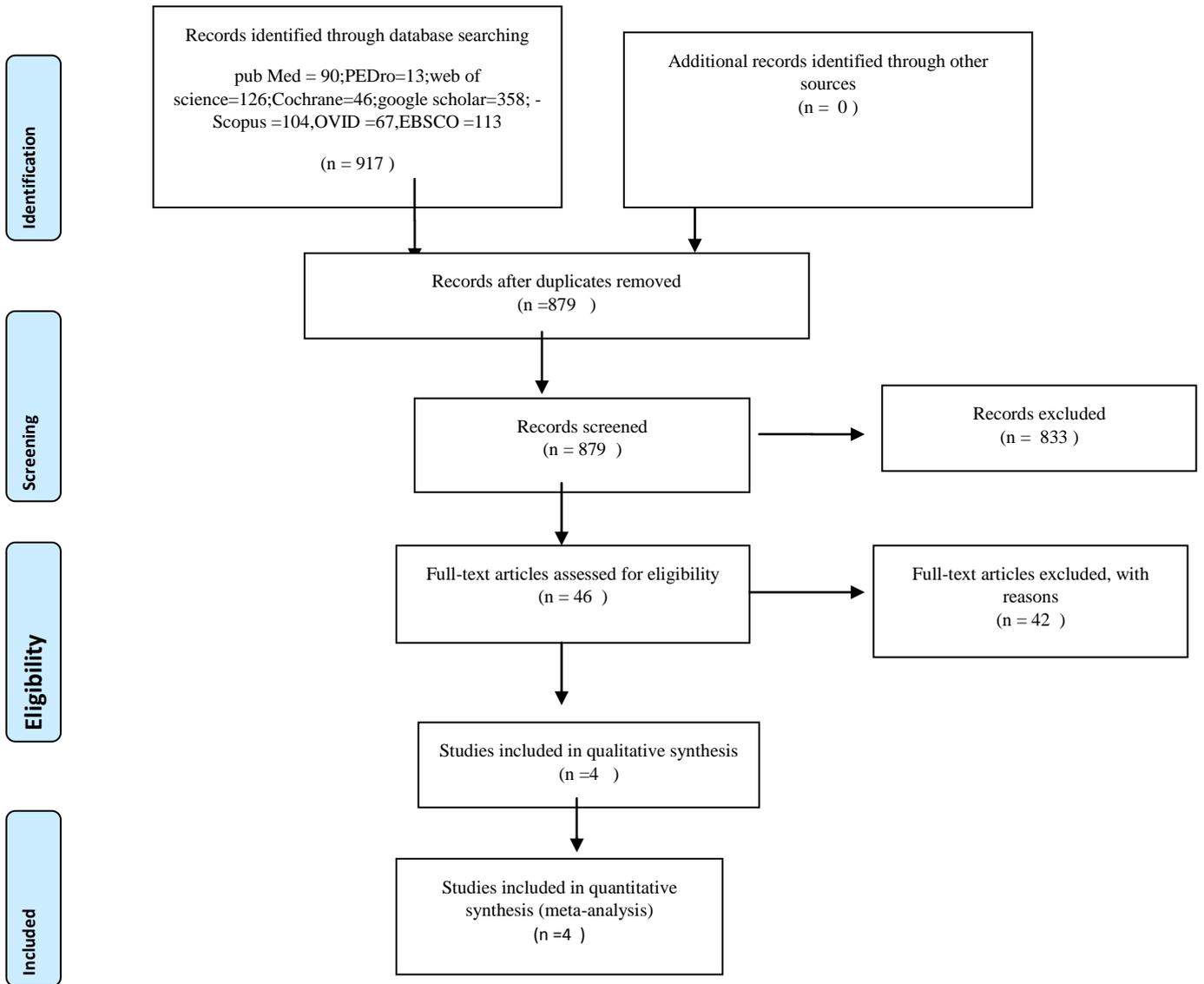


Figure (1): PRISMA flow diagram

E-Data extraction: To ensure that no significant information was omitted from the studies, the following data were recorded during data extraction: study information, subject characteristics, control/intervention group, outcome measurements, patient assessment and follow-up period, results and any other comments specific to each study (Table 1)

Table (1): Data extraction sheet

No	Study	Subject	Control/Intervention	Outcome measures	Patient assessment /follow-up	Resultes/comments
1	Ibrahim et al. 2017.[6]	-10-14 y. -N=30. -mild to moderate hemophilia.	Control group(n=15) -Traditional PT program. Intervention group: (n=15) -received sensorimotor training +traditional PT program.	Pain: by the self report faces scale. -stability: by Biodex Stability System	ase line assessment -8weeks after PT course.	-Sensory motor training improve balance and pain intensity.
2	EL shamyet al. 2016.[7]	9-13years. -N=30 - mild to moderate hemophilia A.	-control group (n=15) - received conventional ptprogram+placebo HILT. Intervention group (n=15) -received conventional PT programe +active HILT.	Pain: by VAS. - Functional capacity by (6MWT). - Gait: by the GAITRiteVR system	base line assessment . -after 3 months after PT course.	-HILT is effective in pain reduction, increasing functional capacity, and improving gait performance.
3	Eid et al. 2015.[8]	-9 to 13 y. -N=30 -moderate hemophilia A.	Control group(n=15) - received the traditional PTprogram +LLLT.(group I) Intervention group - received the same PT program +PEMF therapy.(group II)	Pain : byVAS. - ROM: by a universal goniometer. - Swelling: by the tape measurement. - Physical fitness: By The 6MWT.	base line assessment . -after 3 months after PT course.	-both LLLT and PEMF are effective in the treatment of hemarthrosis, reducing pain, swelling, increasing ROM, and improving physical fitness. - 12 w provide significant improvement than 6 wof treatment. - Laser provides significant and rapid improvement than EMF.
4	Abd EL-monem etal. 2015.[9]	-10 to 16 y. N=40.- -moderate hemophilia A or B.	Control group(n=20) - received designed rehabilitation program only.(Group II) Intervention group (n=20) - received isokinetic training + designed rehabilitation program.(Group I)	-Physical functioning: byBiodex isokinetic dynamometer. -pain : byVAS . -functional abilities: byFISH.	base line assessment . -after 6 w after PT course.	-Isokinetic training increase muscle strength, reduce pain and improve mobility

Pt ;physical therapy , HILT; high intensity laser therapy ,VAS;visualanaloge scale , 6MWT; 6 minute waking test , LLLT; low level laser therapy, PEMF; pulsed electromagnetic field , ROM; range of motion, FISH; function independent score in hemophilia.

F-Methodological Quality and level of evidence:

Methodological quality of trials was assessed by using PEDro scale and the result was two studies with a score of 7, one study with a score of 6 and one study with a score of 4. The strength of evidence was determined by using modified sackett score and the result was three studies 1b (moderate strength) and only one study was 2a (limited strength) as shown in table (2)

Table(2):Pedro scores and level of evidence for included studies

Study	Eligibility criteria	Random allocation	Allocation concealment	Baseline similarity	Blind subject	Blind therapist	Blind assessor	Adequat follow-up	Intention-to-treat	Between group comparison	Both point measure	Total score	Level of evidence
Ibrahim et al.(2017)	YES	YES	YES	YES	NO	No	NO	YES	YES	YES	YES	7	1b
El-Shamy et al . (2016)	YES	YES	YES	YES	YES	NO	NO	NO	NO	YES	YES	6	1b
Eid et al.2015.	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	YES	7	1b
Abd EL-monem etal. 2015.	YES	YES	NO	YES	NO	NO	NO	NO	NO	YES	YES	4	2a

Results

Four studies assessed pain in time of evaluation post intervention .For overallpain effect (post intervention), there was significant change in pain

(n=4 studies, n=130participants, Std. Mean Difference(SMD)=-0.68; 95% confidence interval (CI), -1.12 to -0.25; P=0.002; I²=97%).as shown in table (3)

Table (3): Meta-analysis of pain.

Outcomes measured	Study name	SMD (95% CI)	P-value	Weight (%)	SMD (95% CI)	I ²
Pain	Abd El-Monem et al. (2015)	3.97 (2.91 – 5.03)	0.0001	17.13%		97%

Discussion

There are many physical therapy modalities that were studied to investigate its role in pain management in children with hemophilia including sensory motor training, laser , electromagnetic field and isokinetic training .The level of evidence of three studies out of the four was

1b(moderate) and only one study was 2a(limited) according to modified sackett score.

Ibrahim et al.,(2017) investigated the effect of one of physical therapy modalities (sensory motor training) in controlling pain and balance. in conclusion of this study, the outhor reported that sensorimotor training

appears to improve balance and pain intensity after eight weeks of application and this study may provide rationale for adding sensorimotor training as part of a multifaceted exercise program for patients with hemophilia, particularly if there is a history of balance impairment. The difference of the post training values between the two groups could be attributed to improved posture and movement perception by the effect of sensorimotor training. Hertel et al (2008) suggested that sensorimotor training has the ability to enhance balance ability and improve of postural stability by improving mechanoreceptor function, which could lead to restoration of neuromuscular control of the joints ^[10].

El-Shamy et al .,(2016) investigated the effect of one of physical therapy modalities(High intensity laser therapy) in controlling pain ,function capacity , and gait . in conclusion of this study, the outher reported that HILT is an effective physical therapy modality for children with hemophilicarthropathy. In fact, the HILT programme is effective and has a more effect than a placebo laser in pain reduction, increasing functional capacity, and improving gait performance. The results of this study agree with that of Viliani et al(2012) .which revealed that a short-period application of the HILT biostimulating protocol is more effective in pain reduction and in functional ability improvement than no treatment in patients with symptomatic knee osteoarthritis ^[11].

Eid et al., (2015) compared the effect of low-level laser therapy (LLLT) to that of pulsed electromagnetic field (PEMF) in treatment of hemarthrosis. The results of the study demonstrated that both LLLT and PEMF are effective modalities in the treatment program of hemarthrosis. Twelve weeks of treatment of both modalities provide significant improvement than 6 weeks of treatment. Laser therapy provides significant and rapid improvement than electromagnetic therapy in the treatment of hemarthrosis-related problems .The results of the study group II demonstrated the reduction of pain ratings, swelling, and improved ROM of the knee joints, in addition to reduced erythrocyte sedimentation rate(ESR)and leucocytes as well as improved physical fitness after exposure of PEMF. These results are consistent with Tiktinsky et al (2010). that showed PEMF relieved pain effectively in joint problems of 38 patients with hemophilia. In addition, the ROM of these painful joints and the patients' walking abilities improved significantly ^[12].

ABD EL-MONEM et al .,(2015) this study investigate the effect of isokinetic training on muscle strength, pain and mobility in children with hemophilia. The results of the study provided evidence that, isokinetic training can be used safely in children with hemophilia and it is beneficial in increasing muscle strength, reducing pain and improve mobility. This also comes in agreement with Hazneci et al.,(2005) who reported that, isokinetic training is beneficial in improving

muscle strength and improve joint position sense^[13].

As demonstrated by meta analysis there were 3 studies equal in their effect [7,8,9] but the most effective one is effect of isokinetic training as its effect appear in short duration while the last effective one is effect of sensory motor training .

Limitation of review

One of articles had a low score on Pedro scale because of limitations in the accurate description of allocation concealment, lack of intention to treat, lack of blinding for subject, assessor and evaluation and lack of measures of at least one key from more than 85%^[9]. included only studies published in English and, therefore, there is a possibility that relevant literature published in other languages may have been excluded.

Another limitation of this review is related to the lack of descriptions of adverse effects in the included studies, which compromises the safety of the reported interventions.

Recommendation for further research

We suggest that new randomized controlled trials be conducted with more participants and greater standardization of the evaluation and intervention methods.

Conclusion

This systematic review suggests that physical therapy modalities promote a reduction in the perception of pain ,balance, function capacity ,gait ,ROM,

swelling , muscle strength ,and mobility .

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