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# Physiotherapeutic Strategies In Migraine Prophylaxis: A Review

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**Abstract**
Migraine headache has a significantly negative impact on both individual and societal health. Prophylactic medications have been administered on patients who suffer from frequent migraines.
The objective of present review is to comprehensively evaluate and synthesize the evidence from existing clinical trials on the efficacy of specific physical treatments in addressing migraine headaches, as patients frequently seek nonpharmacological options upon request. Consequently, physiotherapy treatments are commonly recommended. The inclusion criteria involved randomized controlled trials that examined the impact of physiotherapy on migraine headache. The RoB tool 2.0 was employed to evaluate the potential for bias in the selected studies. The findings were reported following the guidelines outlined in the Cochrane handbook and the PRISMA statement. From the initial 342 studies identified through the electronic search, 8 studies met the predefined inclusion and exclusion criteria and were included in this review. Among these studies, the majority demonstrated positive outcomes in clinical measures for migraine headache following physiotherapy treatment. However, one study did not reveal any significant changes in this regard. The current systematic review did not provide a definitive conclusion regarding the medium-term and long-term effects of physiotherapy interventions on migraine headaches. This emphasizes the importance of conducting high-quality research in the future to address this gap in knowledge.

**Key words**: Migraine, headache, Physiotherapy, Exercise, Treatment.

## INTRODUCTION

Recurrent headache episodes are part of the disabling condition known as Migraine. According to reports, 10–12% of the general population suffers from Migraines [1]. This illness has a significant effect on a person's functional ability at workplace, quality of life and ability to participate in social activities [2].
Both pharmaceutical and non-pharmacological treatments are available to reduce headache episodes their frequency and intensity. Pharmacological therapy appears to be effective for prophylaxis and some acute cases. However, occasionally treatment is unsuccessful or has negative effects, and some patients end up with chronic illnesses. Chronic headaches increase the number of medical visits and can even result in drug overuse headache, which costs the healthcare system expense. Physiotherapy, which includes many modalities such aerobic exercise, manual therapy, electric stimulation, therapeutic pain neuroscience education, and relaxation therapy, is a non-pharmacological treatment for migraine [3]. After reviewing the literature, more than 90% of patients reporting migraine have cervical musculoskeletal dysfunction [4]. Therefore, it is surprising that despite of many patients suffering from Migraine, there is hardly any evidence or physiotherapeutic protocol for the management of Migraine [2].
Most of the systemic reviews focused on the specific interventions for Tension type headache and cervicogenic headache only. There were a few trials on migraine. In order to update and summarize the currently available literature-based information about the efficacy of various physiotherapeutic approaches in the therapy of Migraine, this research undertakes a systematic evaluation of Randomized Controlled Trials (RCTs).

## METHODS

### Study Protocol

The present systematic review follows the Cochrane Handbook's reporting rules and recommendations, as well as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria. The main focus of current review was to investigate the impact of various physiotherapy approaches on the management of Migraine. To establish a search strategy for retrieving research articles for attaining the objective of the present study, the PICOS format was used. PubMed, Scopus, Google Scholar, Allied and Complementary Medicine Database, web of science, Cochrane library and Physiotherapy Evidence Database (PEDro) online bibliographic database were identified and used for the eligible studies. Keywords used in the search were; electrotherapy, exercise therapy, physiotherapy, physio-therapeutic treatments, mobilization and massage combined with keyword migraine.

### Study Selection

To ensure the exclusion of duplicate content, the articles obtained from multiple databases were merged. Subsequently, the eligibility of the studies was evaluated based on predefined criteria by two independent reviewers (S.K. and S.P.) through the assessment of the title and abstract. Later, the same reviewers independently assessed the full-text articles for

relevant population, intervention, comparators, and outcomes prior to data extraction. In the event of any disagreements regarding the inclusion or exclusion of a study at any stage, resolution was achieved through discussions involving the third and fourth authors. The study inclusion criteria consisted of human randomized clinical trials with concurrent comparison groups or comparative observational studies that assessed the effectiveness of physiotherapy treatments for migraine. The authors (S.K. and S.P.) independently extracted data on various aspects including trial characteristics (study design, duration, year conducted), sample details (population size, their age, gender), intervention details (treatment type, intensity, number of sessions, frequency, time span), outcome indicators, and key findings. In cases where conflicts arose between the reviewers, a consensus meeting was held involving the two authors (S.K. and S.P.), and any remaining conflicts were resolved by third author (E.H.).

**Data collection process**

The data were manually extracted by one reviewer, who then had another reviewer check them for accuracy. The extracted data were recorded in a predefined extraction table that included author name, publication date and country name along with the following information: i) Diagnostic classifications; iii) participant counts, age, and gender of each group; iv) information about the intervention given to each groups (experimental and control), timing, frequency/ intensity and duration of treatment; v) outcome measurements for each group, including measurement instruments and time points of assessment; and vi) major findings provided by the author. In cases where crucial information was missing, the respective study authors were contacted for clarification.

**Risk of bias Assessment**

to assess the risk of bias in selected randomized controlled trials (RCTs), the Cochrane risk of bias tool was used. The checklist for this assessment can be found in Figures 2 and 3. Two independent reviewers (S.K. and S.P.) evaluated the included articles. Each item in the RoB assessment was assigned a rating of "1", "0", or "?". A rating of "1" indicated that the amount of information was sufficient and that bias was improbable. A rating of "0" meant that although there was sufficient information, but the article did not satisfy a particular requirement. A rating of "?" was given when the information provided was unclear. Disagreements between the reviewers were resolved through consensus. To assess the risk of bias for included eight studies the RoB tool was applied [3,5-11]. The author of the relevant paper was contacted for clarification in cases where there was uncertainty in the analysis of the risk of bias.

**Table 1: PICOS and Eligibility Criteria list**

| | **Inclusion criteria** | **Exclusion criteria** |
|---|---|---|
| **Population (P)** | Diagnosis of Migraine defined by ICHD or IHS as having an aura or not | Less than 18 years of age, pregnancy and other type of headache |
| **Intervention (I)** | physiotherapeutic interventions such as: electric stimulation, massage, Therapeutic pain neuroscience education, manual therapy, aerobic exercises etc. | Interventions which are not considered as conventional physiotherapy treatment. |
| **Comparison (C)** | N/A | N/A |
| **Outcome (O)** | Study should include at least one of the following outcomes: Number of migraine days, migraine attack frequency, pain level, length of migraine episodes and parameters of quality of life. | - |
| **Study Design (S)** | RCTs (Randomized clinical trials), randomized controlled trials and clinical trial. | Review studies, meta-analyses, observational and case-control studies, Language other than English and studies published before January 1, 2002 |

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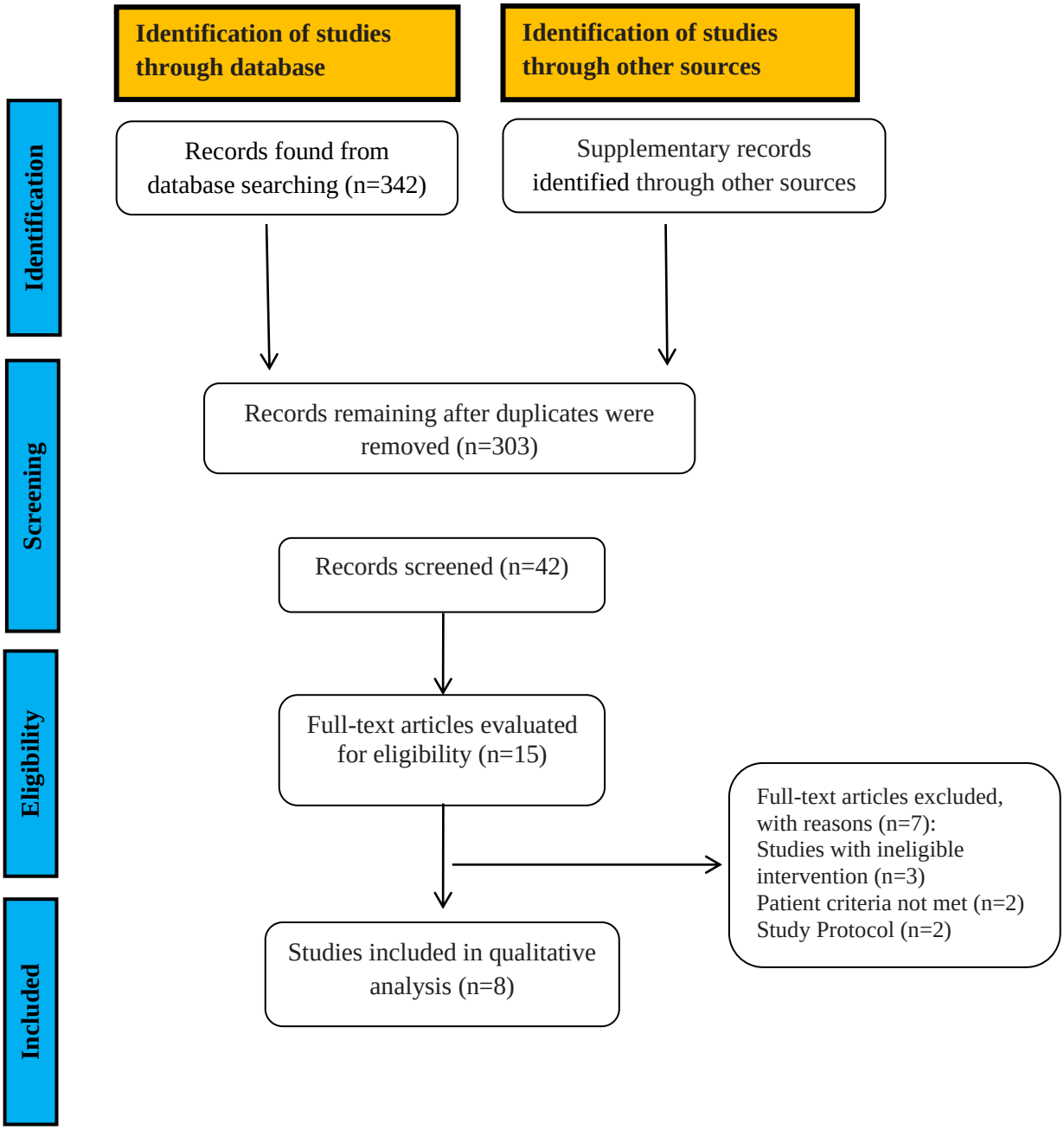


**Figure 1:- PRISMA Flow chart of search strategy and retrieval of articles.**

## Result

### Study Selection

The electronic search database and additional sources yielded a total of 342 records (Figure 1).
After deleting duplicates and checking titles and abstracts, 15 reports were thoroughly evaluated. (Table 1). Eight studies out of fifteen were evaluated for qualitative synthesis, and seven papers were excluded for a variety of reasons.

### Study characteristics

The eight studies that included in this study evaluated various physiotherapeutic approaches, including manual therapy, trigger point treatment, soft tissue techniques, aerobic exercises, and other physiotherapy techniques.
The most often assessed outcome tool was visual analogue scale (VAS) to measure headache intensity [6,11], Migraine Disability Assessment, headache disability inventory. A daily headache diary was used to track the frequency of headaches (1 week to 30 days) [7,9], migraine disability assessed via Migraine Disability Assessment (MIDAS) [3,5,8], headache disability index via HDI [7] and neck disability via NDI -6, impact of headache on HIT-6 [8]. Quality of life was measured in four studies [3,5,8,10] by using Migraine Specific Quality of Life., SF-36 and PLC. Pain pressure threshold was measured in three studies [3,7,9] by using pressure argometer and digital manual dynamometer. Depression was measured

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via using BDI [10,11]. The patient global impression of change scale was used to evaluate self-reported perceived change following treatment [5,9]. All the included studies primarily evaluated only the short-term effects of physiotherapy interventions in migraine patient.

**Risk of bias and level of evidence**- The review includes a total of eight studies. All the studies reported random sequence generation and were thus classified as having little chance of bias in selection. Allocation concealment was observed in two trials [3,11], whereas the likelihood of selection bias was uncertain in six others [5-10]. Because six trials did not report on patient and personnel blinding, they were ranked as having a high risk of performance bias. Three trials did not report on outcome assessor blinding, while four trials indicated a risk of detection bias that was unclear. Only one study [8] had an unknown risk of attrition bias, while rest seven had a low risk. All the studies were found to have a low risk of selective reporting bias. Detailed summary of the risk of bias assessment is shown in supplementary file.

**Synthesis of the results**

Table 2 summarizes the participant characteristics, the type of group intervention, and the key findings for each particular study.

**Table 2: Summary of included literature.**

| Author, Year, Country | Diagnosis | Sample Size | Experimental group intervention | Control group intervention | Outcome measures | Main findings reported by trial authors |
|---|---|---|---|---|---|---|
| Gupta *et. al.*, 2022, India [3] | Migraine | n=50 | n= 19f, 6m; 26.84±7.61 Aerobic Exercises and Therapeutic Pain Neuroscience Education plus conventional treatment, Cervical Spine Exercises for ROM and Passive stretching for relaxation<br><br>45 minutes every day, three days per week for six weeks. | n= 13f, 12m; 31.56±6.86 Cervical spine exercises for ROM and Passive stretching for relaxation. 2 sets of 15 repetitions each, 30 seconds. Hold for 20 minutes every day, 3 days per week for 6 weeks. | Disability; MIDAS. Pain Pressure threshold; Pressure Algometer. Forward head Posture; Craniovertebral Angle Quality of Life; Migraine Specific Quality of Life. Data were recorded at baseline and post-intervention (end of 6th Week) | Combining Therapeutic Pain Neuroscience Education and aerobic exercises with conventional therapy may enhance Quality of Life, reducing disability, increasing Pain Pressure Threshold, and increasing Cranio-vertebral Angle in Migraine sufferers. |
| Munoz-Gomez *et. al.*, 2021, Spain [5] | Migraine; ICHD-III | n=50 | n= 19f, 6m;39.1 ±9.9 Manual therapy based on articulatory: occiput-atlas-axis articulatory manipulation, upper (C0–C1) and middle cervical spine (C2–C7) mobilization, cervico-thoracic junction, upper thoracic spine (T2-T6) and global sacroiliac joint articulatory manipulation. Intervention 4 session for 4 weeks | n= 20f, 5m; 37.6 ±9.42 Placebo intervention: gently placing the palms of both hand under the occiput for 10 min. No force or movement was applied. | Migraine disability: MIDAS questionnaire (before, immedately after, and after 1 month follow-up after the intervention) QOL: Short Form-36 Health Survey (SF-36) (before, immedately after , and after 1 month follow-up after the intervention) Self-reported perceived change after treatment: The Patients' Global Impression of Change scale. (immedately after , and after 1 month follow-up after the intervention) | Manual therapy protocol reduce pain related, disability, its intensity and improve patient's quality of life. |
| Rezaeian et. al., 2021, Iran [6] | Migraine ; IHS | n=40 | n=12f, 8m; 40.40±11.27 myofascial release and streching of | n=12f, 8m; 37.45±8.9 Placebo; soft and | pain intensity; VAS Neck disability; NDI, cervical range of motion (CROM); goniometer. | Stretching and myofascial release treatments were |

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| | | | Suboccipital, Sternocleidomastoid and upper trapezius muscles<br>The treatment lasted for 2 weeks and consist 6 sessions (every week three sessions) with a duration of 20 min per session | superficial massage | All Outcomes were evaluated at baseline, immediately after the treatment, and after 1-month follow-up. | successful in reducing migraine headache patients' symptoms. |
| Rezaeian et. al., 2019, Iran [7] | Migraine; ICHD-I | n=40 | n= 12f, 8m; 40.40 ±11.27<br>soft tissue techniques (treatment) group; myofascial trigger points and stretching for upper trapezius, suboccipital, Sterno-cleidomastoid Muscle<br>Treatment involved 6 sessions (3 sessions every week) for 2 weeks for a duration of 20 min. per session. | n=12f, 8m; 37.45 ±8.9<br>placebo control group; soft and superficial massage while participants were in the supine position | Headache frequency, intensity, duration, drug consumption; Daily Headache Diary<br>Pressure Pain Threshold (PPT); An electronic pressure algoMeter.<br>Headache Disability Index; HDI,<br>All outcome measures were measured at baseline, after the treatment and after 1-month follow-up. | The soft tissue techniques were beneficial for enhancing several migraine-related factors, including headache parameters, medication use, functional impairment, and PPT levels of the cervical muscles. |
| EspıLopez, *et. al.*, 2018, UK [8] | Migraine; IHS | n=46 | n= 22f, 1m; 34.2± 13.5<br>myofascial trigger point (MTrP) therapy and stretching of sternocleidomastoid and upper trapezius muscles bilaterally. suboccipital soft tissue inhibition and suboccipital stretching.<br>The treatment lasts for 8 weeks which includes 4 sessions (one every 15 days) with a duration of 30 minutes per session | n=16f, 7m; 34.9±9.4<br>MTrP therapy and stretching of sterno-cleidomastoid and upper trapezius muscles bilaterally<br>The treatment lasts for 8 weeks which includes 4 sessions (one every 15 days) for duration of 20 minutes per session | Impact of headache.; Headache Impact Test (HIT- 6)<br>Disability; MIDAS<br>Quality of life; SF-36 questionnaire<br>All Outcomes assessed at before treatment and 1 week immediately after the end of treatment. | Stretching and MTrP therapy both reduced the frequency, severity, and impact of migraine attacks. However, the therapeutic effect was greatest when suboccipital soft tissue inhibition was added. |
| Bevilaqua-Grossi *et. al.*, 2016, Brazil [9] | Migraine; IHS | n=50 | n=25f, 0m; 34<br>Group receiving both physical therapy and medicines 15 minutes of diaphragm respiratory training, 5 minutes of cervical mobilisation and traction, 15 minutes of massage treatment and myofascial release, and 6 minutes of digital compression on muscle trigger | N=25f, 0m; 37<br>Control group. Migraine medication | Headaches frequency and intensity; 30-day headache diary<br>Global change perception; Patient Global Impression of Change Scale<br>PPT; digital manual dynamometer<br>Data were recorded at baseline, posttreatment, and 1-month follow-up. | Physical therapy can increase the cervical pressure pain threshold, predict clinically significant improvements, and improve patient satisfaction, but it does not further improve migraine treatment. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | points. neck muscles being passively stretched Each session of passive stretching, which lasted 50 minutes, was performed three times and sustained for 30 seconds every two weeks for four weeks. | | | |
| Dittrich *et al.*, 2008, Austria [10] | Migraine; ICHD-I | n=30 | n=15f, 0m; 33.7± 12.5<br>In a six-week, twice-weekly indoor exercise programme, the aerobic exercise group engaged in 60-minute sessions that included 45 minutes of music-accompanied gymnastics and 15 minutes of gradual muscle relaxation. The 45 minutes of aerobic exercise consisted of a 5-minute warm-up, 15–25 minutes of aerobic activity, which included coordination training, 10–20 minutes of strength training, and a 5-minute stretching session. | n=15f, 0m; 32.1± 12.1<br>Study information on the possible effects of physical exercise was provided to the control group, along with routine medical treatment. | Sensational and affective dimensions of pain; Schmerzempfifindungs-Skala, SES<br>body image; (Fragebogen zum Ko¨ rperbild, FKB-20),<br>depression;Beck-Depressions-Inventar, BDI),<br>quality of Life; Profifil der Lebensqualita¨t chronisch Kranker, PLC.<br>All Outcomes were measured at baseline and after treatment | Aerobic exercises reduce the depression related symptoms and self-rated migraine pain intensity. But no significant differences in psychological variables between groups were found. |
| Lemstra *et. al.*, 2002, Canada [11] | Chronic Migraine; IHS | n= 80 | n= 32f, 12m; 35.59± 10.15<br>Exercise therapy sessions, massage therapy, aerobic exercise, stretching, and light weight training<br>6-week intervention | n= 21f, 15m; 33.17 ± 13.21<br>standard medical care | self-perceived pain intensity, frequency, and duration;VAS, Pain Disability Index, Beck Depression Inventory II.<br>All Outcomes were measured at the end of the 6-week of intervention and at a 3-month follow-up. | A low-cost, group-based, multidisciplinary intervention for migraineurs can lead to positive health-related results. |

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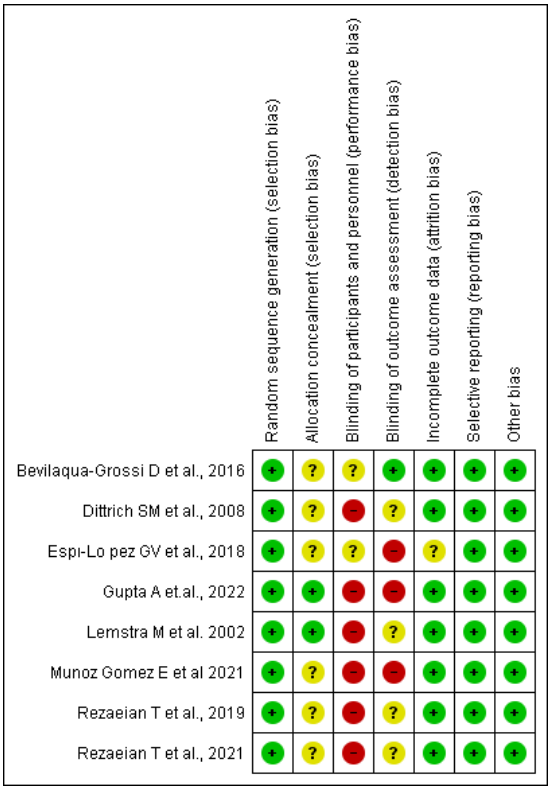


**Figure 2: Risk of bias summary: review author's judgements about each risk of bias item for each included study.**

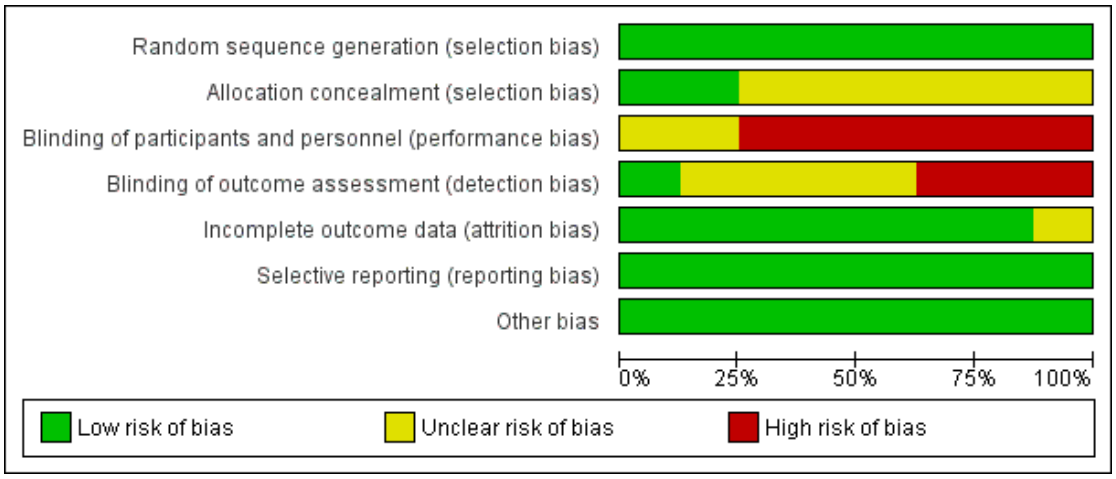


**Figure 3: Risk of bias graph: review author's judgements about each risk of bias item presented as percentages across all included studies.**

**Discussion**

The objective of this review was to evaluate and synthesize the available literature on the effect of physiotherapeutic interventions to improving treatment outcomes in migraine sufferers. A qualitative synthesis was conducted based on the inclusion of eight studies in total. The majority of these studies (seven out of eight) obtained through the search revealed significant improvements in headache duration, frequency, intensity, and quality of life among migraine patients who underwent physiotherapy interventions. However, it is worth noting that only one study reported no additional improvement in migraine treatment with physical therapy. Nonetheless, this particular study did find that physical therapy raised the cervical pressure pain threshold, anticipated clinically significant changes, and improved patient satisfaction. This literature search indicates that there was short- or medium-term effects of comprehensive physiotherapy interventions on many of the treatment variables. In 2021, Munoz-Gomez *et. al.*, conducted a ground-breaking study focusing on patients with migraines. This study was the first of its kind to evaluate the therapeutic impact of manual therapy utilizing articulatory techniques [5] The reason behind this novel approach could be attributed to the possibility that joint mobilization techniques employed in the articulatory group could elicit systemic neurophysiological reactions in both the

peripheral and CNS, thereby pain is suppressed among migraine sufferers. The literature search of the present study revealed three studies on the effect of aerobic exercise along with other physiotherapy intervention on migraine patients [3,10,11]. In a 2022 study, Gupta et al. examined the combined benefits of a 6-week programme that included aerobic activities and therapeutic pain neuroscience education (TPNE) in migraine sufferers. The goal of the study was to assess how this combination intervention affected quality of life (QOL), pain threshold, head position, and disability. The results indicated that the group receiving aerobic exercises along with TPNE demonstrated significant improvements in all measured variables following the intervention. Notably, compared to the group undergoing conventional exercise alone, the aerobic exercises plus TPNE group exhibited a significantly greater reduction in migraine disability score, Increased quality of life, increased head posture, and increased pain threshold. In addition, the experimental group reported a larger reduction in impairment than the typical exercise group, and the study also discovered a significant difference in the migraine disability ratings between the two groups after the intervention [3].
The self-reported severity of migraine pain was demonstrated to decrease in 2008 research by Dittrich et al. that combined an aerobic exercise routine with relaxing techniques.This reduction occurred over a period of 6 weeks, with participants engaging in a 60-minute indoor exercise program twice a week. Additionally, it can be posited that various nonpharmacological therapies for migraines, including exercise and relaxation, promote an active behavioral coping mechanism that facilitates beneficial cognitive processes such as fostering a sense of self-control and self-regulation. Despite improvements in the depressed symptomatology of the aerobic exercise group, there were no discernible changes in the psychological traits of the aerobic exercise group and the control group in terms of those psychological factors [10]. According to Lemstra *et. al.,* in 2002, a 6-week intervention programme that included exercise therapy sessions, massage treatment, aerobic activity, stretching, and mild weight training showed encouraging effects as a cost-effective and interdisciplinary strategy. This intervention, conducted outside of a clinical setting, successfully decreased self-reported pain frequency, intensity, duration, average pain intensity, most intense pain, mild pain intensity, pain-related disability, and depression among migraine patients while simultaneously enhancing their perceptions of their functional status, quality of life, and overall health status [11]. In another study conducted by Rezaeian *et. al.,* in 2019 and 2021, the impact of stretching and myofascial release treatments on different clinical outcomes of migraine headaches were examined. The study implemented a 2-week treatment protocol. The authors recognized the potential efficacy of employing soft tissue techniques to alleviate trigger points, which could contribute to the reduction of migraine headaches and associated disability. Furthermore, these techniques were found to be effective in enhancing clinical outcomes for migraine patients, including reducing pain intensity, improving cervical range of motion (CROM), and reducing functional disability [6-7]. These results align with other studies that has identified myofascial release methods as a favorable approach for managing patients with migraine headaches [8,9]. In contrast to the results reported by Bevilagua Grossi *et. al.,* in 2016, our findings indicate that additional benefits in terms of the frequency and intensity of migraine attacks could not be substantiated through a physical therapy protocol. Nevertheless, the physiotherapy plus medicine group showed notable clinical benefits, including substantial decreases in headache frequency and severity, as well as a positive assessment of change and high patient satisfaction with the treatment. Considering the aforementioned results, majority of the studies illustrated significant positive effect of physiotherapy interventions on migraine headache [3,5,6-8,10-11], however one of them [9] were not able to show any additional significant benefit of physical therapy protocol in migraine. To the best of our understanding, this is the first systematic review examining the impact of physiotherapy interventions on migraine headaches. This study offers valuable insights into the existing body of literature regarding the influence of physiotherapy intervention protocols on clinical outcomes, as well as the enhancement of patients' quality of life and psychological well-being. However, further research is warranted to explore the medium- and long-term effects of physiotherapy management strategies on a larger and more homogeneous patient sample, utilizing consistent outcome measures.

**Conclusion and future scope**

The current review identified a limited pool of eight eligible studies. Among them, seven studies indicated that a combination of diverse physiotherapy approaches with exercise exhibited notable effectiveness in reducing the intensity and frequency of headaches in patients with migraines, particularly in the short term. Consequently, these treatments could be viewed as supplementary approaches of standard care. However, it is important to note that one study did not find any significant benefits of physiotherapy interventions for migraine headaches. Moreover, there was a dearth of literature on this subject, and the data were very heterogeneous and subject to bias. Because of this, the results of this analysis do not permit making a definitive claim on the long-term efficacy of physiotherapy therapies for migraine headaches. These limitations underscore the necessity for well-designed randomized controlled trials (RCTs) to be conducted in the future. These future studies would not only provide more comprehensive evidence but also specifically investigate the mid-term to long-term effects of physiotherapy on migraine headaches. The conduction of high-quality RCTs is vital to confirm the current results and draw definitive conclusions, addressing the existing gaps in knowledge in this field.

**Abbreviation**

RoB: Risk of bias
RCT: Randomized Controlled Trials
ICHD: International classification of Headache disorders

IHS: International headache society
VAS: Visual analogue scale
MIDAS: Migraine Disability Assessment
HDI: Headache disability index
NDI: Neck disability index
HIT: Headache impact test
SF-36: Short Form Health Survey questionnaire
PPT: Pain pressure threshold
BDI: Beck-Depressions-Inventor
CNS: Central nervous system
QOL: Quality of Life
TPNE: Therapeutic pain neuroscience education

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**Conflict of interests**
The authors declare no conflict of interest.

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