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Investigating the effect of posture correction exercises on pain and function of patients with cervicogenic headache: a review study

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Abstract

Context: One of the most common problems in cervicogenic headache is disorder of the musculoskeletal system of the neck and cervico-scapular area. Improving the function of the muscles in this area and correcting the posture by reducing the damage to the neck structures reduce headache. The current study reviews and evaluates studies conducted on patients with cervicogenic headaches with the purpose of posture correction.

Evidence Acquisition: The search has been done through Pub Med, Google Scholar, and PEDro databases from March 2022 to June 2023. Among the available Persian and English studies, studies that examined the effect of posture correction exercises on cervicogenic headache patients were selected based on the PEDro scale.

Results: Out of 985 articles searched with keywords, 324 were clinical trials. By reviewing the titles and abstracts of the articles, 10 articles included posture correction exercises. Among them, four articles were completely relevant to the subject and their full texts were available.

Conclusions: Due to the lack of studies in this field and the deficiencies in the existing studies, more studies are needed to be conducted in order to make more accurate conclusions about the effectiveness of posture correction exercises in improving the symptoms of patients with cervicogenic headache.

Keywords: *cervicogenic headache, exercise therapy, neck pain*

Introduction

1. Context

Cervicogenic headache is considered as a secondary headache, which is characterized by symptoms such as unilateral headache and involvement in the neck structures(1-3). Headache is a common disease that affects 47% of the adult population worldwide (4). Almost 15-20% of people with headaches suffer from cervicogenic headache(5). Musculoskeletal system disorders and muscle imbalance in the neck and scapula region are among the most common disorders in patients with cervicogenic headaches(6, 7). Studies have proposed various treatments for cervicogenic headaches(5, 8-12). Drug treatments and non-drug treatments such as physiotherapy, psychotherapy, and invasive interventions are among the treatments provided for cervicogenic headaches(9, 13). Physiotherapy treatments include thermal modalities, dry needling, manual treatments, and exercise therapy(13-17). Among the proposed treatment, posture correction , improving strength, and dissolving movement dysfunctions are accentuate(13, 18).

Recent studies / have focused more on manual therapy and have often investigated and compared the effects of manual therapy with general therapeutic exercises(8, 19-27). Very limited studies have been conducted in the field of exercise therapy and they have directly investigated the effect of exercise therapy and have often emphasized on increasing the strength and tolerance and efficiency of the local muscles of the head and neck region(28-32). Many studies have considered exercise therapy as a secondary treatment(24, 25, 33). Most studies have compared and evaluated headache severity, headache duration, headache frequency, patient's disability, performance, and range of motion of the neck(8, 21,

24-26, 34) and they have rarely examined neck muscle strength, scapula, the function of the postural muscles, and posture correction(28, 30, 35, 36). Based on what was mentioned, most of the studies have investigated manual treatments or prescribed local exercises for the head and neck. Also, through the posture correction viewpoint, the goal is to evaluate and investigate the head and neck, and scapula, and to correct this complex(37, 38). Moreover, recent guidelines also support strengthening exercises and posture correction for the treatment of patients with this type of headache(11).

A review of the studies related to the treatment of patients with cervicogenic headache revealed that most of the studies have investigated the effects of manual techniques and especially manipulation (12, 19, 22, 39, 40). A few of review studies investigated the effect of exercise therapy. One of these articles only presented exercises applicable to patients with cervicogenic headache.. No study was found to review previous articles and their results (18). Other articles did not specifically address exercise therapy. By investigating various treatment methods, they found that exercise therapy is effective in the long-term treatment of patients with cervicogenic headaches(8, 11, 40). None of the review articles have evaluated the effect of posture correction, which is a more comprehensive treatment than local exercises. Due to the limited number of review studies in the field of exercise therapy and the lack of a review study regarding posture correction exercises, conducting a review study in this field seemed necessary. The present study was conducted to investigate the effect of posture correction exercises on the pain and function of patients with cervicogenic headaches.

2. Evidence Acquisition

The current review study started with a comprehensive search using Pub Med, Google Scholar PEDro databases in March 2022 and continued until June 2023. The following keywords were used to extract the articles: Cervicogenic headache, exercise therapy, and posture correction. To conduct this review study, all clinical trials that investigated the effect of exercise therapy in patients with cervicogenic headache were reviewed. Only the articles that were in English or Persian were reviewed. Articles written in other languages or whose full texts were not available were excluded from the study. The PEDro scale was used to examine the quality of articles.

Inclusion criteria

1- Studies conducted on cervicogenic headache.

2- Studies that compared the effect of posture correction exercises with other therapeutic exercise methods and manual treatments.

3- Studies that were in English or Persian.

The primary exclusion criteria

1- Studies whose full texts were not available.

2- Studies that were not clinical trials.

3-Studies that investigated exercise therapy with a focus on strengthening one or more specific muscles.

Chart 1 shows the process of selecting articles.

Results

During the initial search with keywords, 985 article titles were obtained. Among them, 324 were clinical trials. By reviewing the titles and abstracts of the articles, only ten articles used exercises related to posture correction (as the primary intervention or in the control group) to treat patient with cervicogenic headaches. Among these ten articles, four articles were related to the subject of the study and their full texts were available. Due to the heterogeneity of the included articles in terms of implementation method, measurement parameters, type of exercise, and number of subjects, it was not possible to perform a meta-analysis on the included articles. Table 1 presents the summary of the results of the included articles.

A study by Jull et al. (2002) evaluated the effect of manipulation and therapeutic exercise plan for cervicogenic headache patients when used alone or in combination. In the mentioned study, 200 patients were randomly assigned to 4 groups: therapeutic exercise, manipulation, a combination of therapeutic exercise and manipulation, and control. Severity, duration, and frequency of headache, drug consumption, and patient satisfaction were measured before the intervention, after the intervention, and three, six, and twelve months after the intervention by an examiner who was blinded to the type of intervention. In the manipulation group, the patients were treated based on the Maitland method and with both low-velocity and high-velocity techniques (at the discretion of the therapist).

In the therapeutic exercise group, low-load exercises were performed to improve the movement control of the cervico-scapular area and craniocervical flexion movements to strengthen the deep flexor muscles. All of the exercises lead to the improvement of the patient's posture. The treatment lasted for six weeks and consisted of 8 to 12 sessions. The combined group of both treatments and the control group did not receive any physiotherapy treatment. The results revealed that all three treatment methods significantly reduced headache frequency, headache severity, and neck disability index immediately after treatment compared to the control group. These changes were observed until one year later. Only the duration of headache in the combination group was better than therapeutic exercise and manipulation alone(41). Since exercise therapy was used in this study in addition to manual treatments, it would have been better to examine outcomes such as muscle strength, range of motion, and level of muscle activity in addition to subjective outcomes such as frequency, severity, and duration of headaches, disability, and patient satisfaction. This study was one of the strong studies and its method was very close to the purpose of the current study.

The study by Linen et al. (2010) evaluated the effect of exercise therapy on patients with cervicogenic headache. In this study, 180 female employees were randomly assigned to three groups of strengthening exercises, endurance exercises, and stretching exercises. After teaching the patients, the exercises were performed three times a week for 12 months at home. The severity of headache, neck pain, and upper limb pain were evaluated before treatment, immediately after treatment, and two, six, and twelve months after treatment. In the strengthening exercise group and endurance exercise group, cervical scapula exercises were performed, which improved posture. In addition, exercises were used to increase the strength of the deep flexor muscles in both groups. Twenty minutes of aerobic exercises were performed in the stretching group. All three groups performed neck and upper limb stretching exercises at the end of the exercise plan. The results revealed that strengthening and endurance exercises when combined with stretching exercises are effective in reducing the severity of headache and upper limb pain in patients with cervicogenic headache (42).

In the current study, only female employees were investigated, so its results cannot be generalized to the entire population. Also, based on the standard criteria for the diagnosis of cervicogenic headache, the inclusion criteria of this study were not accurate. The exercises were also performed by the patients at home without the supervision of the therapist, and there was no control over the exercises. In this study, the exercises were performed very extensively in all groups. In addition to general exercises, other physiotherapy treatments including massage and mobilization were also used. So it was difficult to interpret the results and judge the effectiveness of the desired treatment. Although the exercises designed in this study can be useful in improving people's posture, not much attention has been paid to this issue and postural changes or even the strength, function, or activity level of muscles have not been investigated. Moreover, other parameters such as patients' satisfaction or improvement of patients' function and ability, which can indicate the effectiveness of the treatment, have not been examined. However, based on Linen, performing head and neck exercises and scapula is suitable for people with cervicogenic headache, and strengthening and endurance exercises do not increase headaches in these patients.

Sharma et al. (2021) evaluated the effectiveness of multimodal physiotherapy treatments on patients with cervicogenic headache. In this study, 27 patients were included in three groups of multimodal treatment, exercise therapy, and control. The treatment in the multimodal group included mobilization techniques according to the Maitland method and exercise therapy (endurance exercises with low-load and active head exercises and cervico-scapular posture correction exercises). The therapeutic exercise group received active exercises in addition to posture correction exercises, and the control group received only posture correction exercises. The treatment continued 3 times per week for 4 weeks. The severity, duration, and frequency of headaches, function index of deep neck flexor muscles, and neck disability index were measured before and after treatment. The results revealed that therapeutic exercise alone improves all the mentioned outcomes. However, its recovery level is lower than the exercise therapy plus mobilization group (33). In this study, the sample Materials were very small, so their results cannot be generalized for the target population. Moreover, the standard criteria for diagnosing cervicogenic headaches were not used for the inclusion of patients in the study. Also, the PedRo score of this study was 3, indicating that this study has low validity. Moreover, the duration of treatment for improving muscle strength and correcting posture was short (43, 44). Also, since all interventions including active exercises, posture correction exercises, and mobilization were included in the multimodal group, after 4 weeks of treatment, better results are expected than the other two groups. It also seems that by eliminating passive treatments, there is a need for more sessions to investigate the effect of active exercises. Additionally, the long-term effects of the performed treatments were not investigated in this study and the long-term results might be in favor of therapeutic exercise. Also, although the goal was to correct the posture, the effects of the treatment in correcting the posture such as range of motion, muscle activity level, correction of muscle imbalance, and balance were not investigated.

Dunning et al. (2016) examined the effect of manipulation compared to mobilization plus exercise therapy on 110 patients with cervicogenic headache. In this study, patients were randomly assigned into manipulation and mobilization plus therapeutic exercise groups. Subjective symptoms of patients such as severity, duration, frequency of headache, index of neck disability, and dose of drug consumption before the intervention, one week, four weeks, and three months after the intervention were examined by an examiner who was blinded to the treatment. The treatment duration was 6 to 8 sessions for four weeks. Manipulation and mobilization were performed based on the Maitland method and with the high-velocity technique on the first and second cervical and first and second thoracic vertebrae. Exercises in the therapy and mobilization exercise group included scapula resistance exercises (with thera band or weights) and exercises to strengthen the craniocervical flexor muscles with biofeedback in three sets of ten. The results revealed that 6 to 8 sessions of manipulation of the neck and thoracic area are more effective than mobilization and exercise therapy, and its effect lasted for up to 3 months (26). The primary goal of this study was not to investigate the effects of exercise therapy. The exercise therapy was used only

as a secondary treatment. In this study, only the patient's subjective symptoms were considered as a measurement of recovery and the effectiveness of therapeutic exercises, and manual therapy.

Based on the conducted studies, passive treatments can be effective in the short term(43, 44) and longer sessions are needed to investigate the effects of active treatments(45, 46). In this study, a maximum of 8 therapeutic exercise sessions were performed. Based on what was stated, this number of sessions is not enough to increase the strength and function of muscles, especially to increase the strength and improve the function of the muscles of the head, neck, and scapula and generally to correct alignment and posture. Therefore, a better effect of passive treatments than active ones was reported. Another deficiency of this article is receiving inadequate treatment in the mobilization and exercise therapy group and the possibility of bias of the therapists.

Conclusion:

Reviewing the mentioned articles reveals that therapeutic exercises, especially posture correction exercises and manual treatments such as manipulation and mobilization can be effective in improving the symptoms of patients with cervicogenic headache. A study by Linen reported all exercises are effective, but the design of this study is ambiguous to some extent since patients have received other physiotherapy treatments such as massage and mobilization in addition to extensive exercises. However, this study is valuable due to the long follow-up and relatively high sample size and indicates the long-term effects of therapeutic exercise(42). The study by Dunning reported that manipulation is more effective than exercise therapy and mobilization(26). It should be noted that the number of exercise therapy sessions was a maximum of 8 sessions and this number of sessions does not seem to be enough to improve function and increase muscle strength(45, 46). The results of this study also showed an improvement in symptoms in both groups, although the manipulation group showed more improvement since in addition to the above-mentioned reasons, only the subjective symptoms of the patients as a measure of improvement and the effect of therapeutic exercises and manual therapy were considered, which is an accurate measure to determine the effects of these two treatment methods. As stated before, Sharma et al.'s study used a very small sample size and also did not investigate the long-term effects of the interventions. Hence, its results cannot be generalized to the entire population and it has low validity(33). On the other hand, it seems that in this study, the duration of treatment for improving muscle strength and correcting posture was short (43, 44, 47). However, in this study, as in Dunning's study, an improvement in symptoms was seen in both groups. The study by Jull et al. was conducted to compare the effect of exercise therapy and manipulation alone or a combination of both treatments revealed that both methods can improve symptoms and the combination of treatments is not significantly preferable(41). Also, most of the studies conducted on the side effects of manipulation report that manipulation of the neck area, especially high-velocity manipulation techniques, can lead to thrombosis by damaging the carotid artery, leading to a stroke or even the death of the patient. Thus, these studies suggest that neck manipulation techniques should be avoided due to the risk of serious side effects such as stroke (48-50). None of the studies have specifically examined posture correction exercises and outcomes such as changes in posture or muscle strength that confirm the effectiveness of this type of treatment. Also, the studies that have investigated exercise therapy suffer some deficiencies mentioned before. Thus, it is not possible to comment accurately on the effectiveness of posture correction exercises in the treatment of cervicogenic headache patients and more clinical trials are needed in this regard.

It is recommended for future studies to investigate the effects of exercise therapy, which is a safer treatment than manipulation, to improve posture. To ensure the effectiveness of posture correction exercises, it is recommended to conduct studies with more intervention sessions and to investigate outcomes such as muscle strength, muscle activity level, range of motion, and postural changes.

Figures and Tables

Chart1

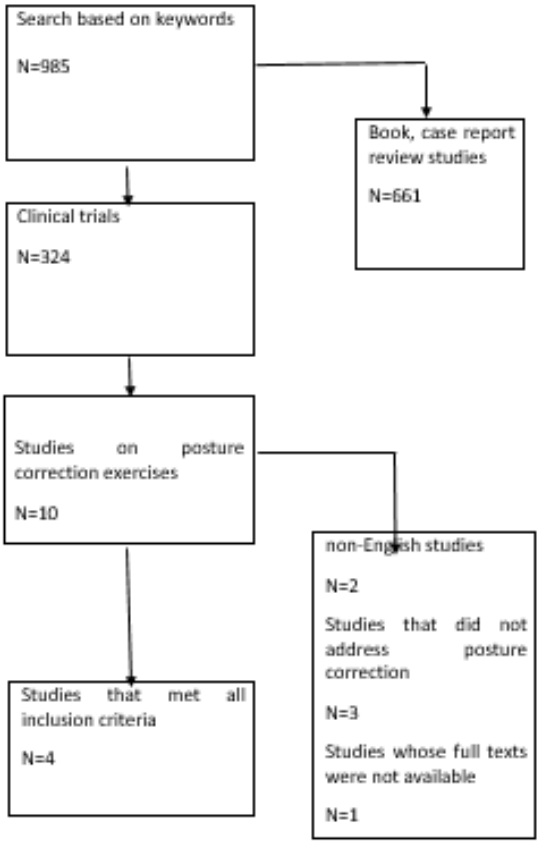

Table 1

PEDro	Conclusion	Measures outcomes	Treatment protocol	Purpose of the study	Number of subjects	Author name-publication year
7.10	Both the manipulation and exercise therapy groups showed a significant reduction in headache severity and frequency, and the combined group did not show a significant preference.	Primary: frequency of headache/ secondary: severity and duration of headache, the dose of the drug, and patient satisfaction	8 to 12 treatment sessions for 6 weeks	evaluating the effect of manipulation and low-load exercise therapy plan for patients with cervicogenic headache when used alone or in combination	200 patients (48 patients in the manipulation group, 51 patients in the therapeutic exercise group, 48 patients in the combined group, and 46 patients in the control group)	Gwendolen Jull 2002
5.10	All treatment methods reduce headache, neck pain, and upper limb pain. Although stretching exercises are less effective than the combination of resistance and endurance exercises.	The severity of headache, neck pain, and upper limb pain	Exercises were performed at home three times a week for 12 months	Comparing the effectiveness of three 12-month exercise plan on headache, and upper limb pain in patients with chronic neck pain.	180 patients (57 patients in the strength exercise group, 59 patients in the resistance exercise group, and 63 patients in the stretching exercise group)	Jariy Linen 2010
3.10	The intervention of mobilization and exercise therapy is more effective than exercise therapy and the control group.	Primary: Severity, duration, and frequency of headache Secondary: Index of neck disability	8 to 12 treatment sessions, three sessions per week,	Evaluating the effectiveness of multimodal therapy (therapeutic exercise and mobilization) in the	27 patients (in three groups including mobilization plus exercise therapy, exercise therapy, and control)	Akanksha Sharma 2011

		and function index of deep neck flexor muscles	for four weeks	treatment of patients with cervicogenic headache		
8.10	6 to 8 sessions of manipulation of the neck and thoracic area are more effective than mobilization and therapeutic exercises, and its effect lasts for three months.	Primary: headache severity/secondary: duration and frequency of headache, neck disability index, and the dose of the drug	6 to 8 treatment sessions in 4 weeks	Comparing the effects of manipulation with mobilization and therapeutic exercise in patients with cervicogenic headache	110 patients (58 patients in the manipulation group and 52 patients in the mobilization plus exercise therapy group)	James R.Dunning 2016

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