




Effects of Physical Therapy-Based Management Approaches for Tension Type Headache

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ABSTRACT

Background of the Study: Multiple Physical Therapy approaches have recently been developed and reported in the literature for providing better results in the treatment regimens of tension-type headaches. The advancement in the field of Physical therapy towards the treatment approaches of tension-type headaches has become the driving force for writing this article.

Methodology: Studies comparing the effects of physical therapy management with conventional treatment approaches are included in the meta-analysis. PRISMA guidelines were used for performing the qualitative analysis and assessment of risk of biases.

Results: According to the findings of nine randomized controlled trials, the analysis of the results had revealed that physical therapy intervention demonstrated a significant improvement in reducing headache severity. In a random effect model, the pool effects of

physical therapy strategies in terms of Standardized Mean Difference had an impact of 1.41, which according to a Cohen rule of thumb displays a larger effect of physical therapy management in significant decrease in pain intensity among tension-type headache patients

Conclusion: The study has concluded that physical therapy-based management strategies as provided in several RCTs analyzed in this review article revealed a pool effect of moderate size in managing the frequency of pain and a larger effect size in managing pain intensity and duration. Further, it was concluded that tension-type headaches can be effectively managed through physical therapy-based approaches.

Keywords: *Functional status, parkinson disease, cognitive dysfunction, disease progression, orthostatic hypotension, tremors.*

INTRODUCTION

Primary headache including tension-type headache and migraine headaches are among the commonly occurring form of headaches that affects almost 47% of the world population¹. Among different types of headaches, the tension-type headache has a prevalence of around 35%, whereas migraine has a remaining 12% of prevalence out of the total population that has been affected by headaches². According to the study, tension-type headache greatly impacts socioeconomic conditions around the globe while creating an economic burden of around 1.6 billion dollars every year; making it one of the costliest disorders worldwide³. Patients complaining of tension-type

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headaches usually describe the pain as a band around the head in the form of pressing and tightening and not throbbing and pulsating, which occurs bilaterally with the intensity of mild to moderate⁴. Tension-type headache does not aggravate usually while performing routine activities such as climbing and descending stairs. Patients suffering from tension type headaches also do not complain of nausea and vomiting; which is actually an obvious symptom associated with migraine^{5,6}. Studies have also provided significant evidence that tension-type headache is 1.5 times more frequent among the female population than males whereas it has also been estimated that during menstrual periods and pregnancy, women experience a more frequent bout of pain including both tension-type headache and migraine; which in some cases even leads to depression among females⁷. Several factors have been considered as a cause of tension-type headaches that includes sleep disturbance, emotional stress, nociceptive muscle pain, muscular tightness, and trigger point on and around the neck⁸. Various management approaches ranging from the prescription of analgesic medication to lifestyle modification have been recommended by the clinician but the role of physical therapy management approaches has made a substantial advancement in providing the long-term palliative relief to the patients^{9,10}. Multiple Physical Therapy approaches have recently been developed and reported in the literature for providing better results as the treatment approaches of tension-type headache which includes strategies like mobilization, manipulation, combination therapy, the release of Trigger points (TrPs), and application of electrotherapy modalities^{11,12}. This recent advancement in the field of Physical therapy towards the management of tension-type headaches has become the driving force for the writing of this review as much literature is available in the database that has been claiming the efficacy of physical therapy-based management approaches in relieving pain. Hence, the current study is being conducted to determine the effects of physical therapy-based management approaches on tension-type headaches.

METHODOLOGY

The guidelines of Preferred Reporting Items of Systematic Review and Meta-Analysis (PRISMA) were followed.

Electronic Databases and Searching Strategies

The researcher incorporated literatures found in the database including Medline, Pedro, Google Scholar, and Web of Sciences. The following MESH words has been used: Tension-type headache, physical therapy, trigger points, and pain. Search Strategies includes use of bullion “and” & “or”

Criteria for Eligible Studies and Participants

Comparative study in which the effects of physical therapy management with conventional treatment approaches are included in the inclusion criteria which determines the impact on intensity, duration, and severity of tension-type headache patients aged >18 years. Articles which are available in full text and English language during the year of 2017 to 2020 have been incorporated as latest research as a source of evidence.

Trials in which any other treatment strategies were incorporated like neck collars and pharmacological pain management strategies other than exercise based approaches were excluded. Besides this, Full-text articles which were unavailable and published articles in which the language was un-preferred were not considered.

Quantitative Analysis

MedCalc Statistical Software was used for quantitative analysis (Version 18.11.3). Inferential statistics were drawn through Continuous measure analysis using a standardized mean difference (SMD). The levels of effect size were measured through Cohen's rule of thumb classification that categories effect size as small= 0.2 to 0.5; moderate=0.5 to 0.8; and large= >0.8. Heterogeneity was determined by the value of I².

Extraction and analysis of data

The data was fetched according to the publication year, study design, targeted population, intervention type, experimental and control group respectively, and the extracted outcome as shown in table 1^{13,21}.

Risk of Bias

Analysis for Risk of Bias was performed on the parameters such as allocation (Random and Concealment), Blinding (Participants and assessment of outcomes), reporting (outcome data and selected), and publication bias²².

Quality Appraisal and Risk of Bias

The risk of bias was analyzed on the basis of the decision of author using Cochrane tool. The tool was used to assess the risk of bias in the domains as shown in Table-1, Figure-1.

Random Sequence Generation

Low level risk of bias had been observed in all nine studies^{13,14,15,16,17,18,19,20,21}.

Allocation Concealment

Similarly, for all randomized controlled trials, the concealed allocation was marked down to have a minimal risk of bias^{13,14,15,16,17,18,19,20,21}.

Blinding of Participants and Personnel

Four studies^{13,14,16,21} considered personnel blinding and the participants, whereas three of the studies^{15,17,19} showed a less risk of bias and two studies^{18,20} showed an unknown risk of bias.

Blinding of Assessment Outcome

Four studies^{14,15,19,21} were found to show a low risk of bias while, four studies^{13,16,17,20} came up with a high risk of bias^{14,17,22} whereas only one study¹⁸ represented an unknown risk.

Incomplete Outcome Data

All studies were found to have a less risk of bias^{13,14,15,16,17,18,19,20,21,22}.

Selective Reporting

All studies were found to reveal a less risk of bias^{13,14,15,16,17,18,19,20,21,22}.

Studies	Random Allocation	Allocation Concealment	Participants Blinding	Outcome Assessment Blinding	Incomplete Outcome Data	Selective Reporting
Togha et al, 2020 (13)	+	+	+	-	+	+
Gildir et al, 2019 (14)	+	+	+	+	+	+
Álvarez-Melcón et al, 2018 (15)	+	+	-	+	+	+
Kamali et al, 2019 (16)	+	+	+	-	+	+
Imani et al, 2018 (17)	+	+	-	-	+	+
Espí-López et al, 2018 (18)	+	+	?	?	+	+
Madsen et al, 2018 (19)	+	+	-	+	+	+
Krøll et al, 2018 (20)	+	+	?	-	+	+
Ferragut-Garcías et al, 2017 (21)	+	+	+	+	+	+

-, indicates risk of bias (High)
+, indicates risk of bias (Low)
?, refers to the defined methodology cannot confirm the risk of bias

Table 1 Cochrane Collaboration's Tool for the Assessment of Risk of Bias of Included Studies

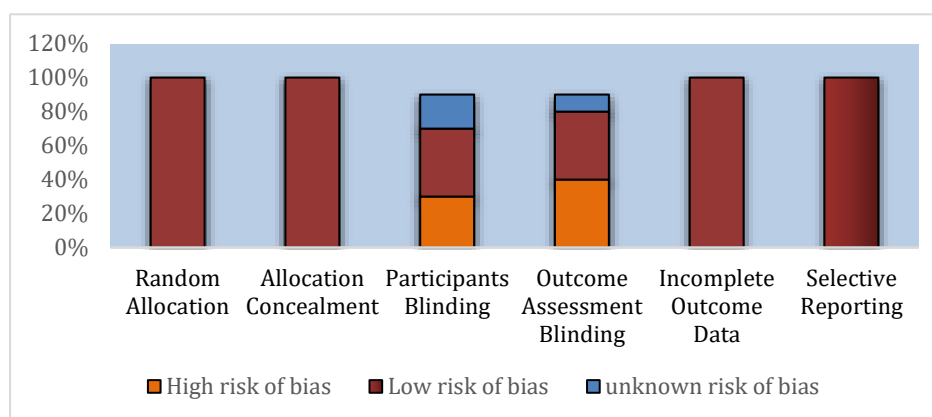


Figure 1 represents the Cochrane Risk of Bias.

RESULTS

A total number N=9 studies were included, after the detailed searching for potentially relevant articles which were published. Searching was performed from various electronic databases. The search strategy produced 790 original articles which were evaluated on the basis of their content and title whereas relevant articles which were full-text were sorted and selected after the elimination of 246 duplications, elimination of articles due to lack of full-text articles, and those which were in un-preferred language. After the full-text screening, only 9 randomized controlled trials met the inclusion criteria targeted physical therapy management approaches on intensity, duration, and severity of tension-type headache. The flow of studies is illustrated in Figure 2.

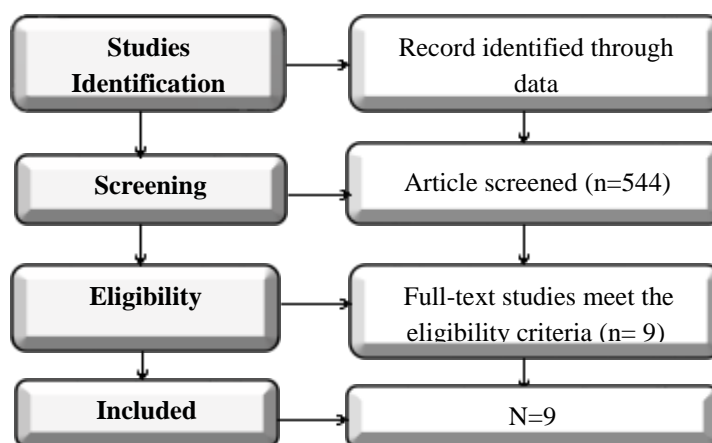


Figure 2 represents the flow of studies in accordance with the PRISMA statement

Author' Year	Sample Size	Target Population	Study Design	Age	Intervention		Extracted Outcome
					Intervention Group	Control Group	
Togha et al, 2020 (13)	24	Episodic tension-type headache	RCT	18-50 years	Dry needling with passive stretching	Passive stretching	Headache intensity (ICHD-3 criteria) and frequency (no of days)
Gildir et al, 2019 (14)	160	Chronic tension-type headache	RCT	20-50 years	Dry needling was used on active trigger points for two weeks, with three sessions per week.	Sham dry needling	Intensity, frequency (no of days), and duration of headaches
Álvarez-Melcón et al, 2018 (15)	152	Tension-type headache	RCT	18-25 years.	Physical Therapy and Relaxation training	Relaxation Exercises	Headache intensity (ICHD-3 criteria), frequency (no of days), and duration
Kamali et al, 2019 (16)	44	Tension-type headache	RCT	N/A	Dry needling.	Friction Massage	Frequency (no of days) and severity of headaches (ICHD-3 criteria)
Imani et al, 2018 (17)	75	Tension-type headache	RCT	19-50 years	Reflexology treatment	Sham management approach	Headache intensity (ICHD-3 criteria)
Espí-López et al, 2018 (18)	78	Tension-type headache	RCT	N/A	Manual Therapy	Observation	Pain and severity
Madsen et al, 2018 (19)	60	Tension-type headache	RCT	18-65 years	Strength training using Elastic resistance	Postural and Ergonomics advice.	Frequency (no of days) and Duration of pain
Krøll et al, 2018 (20)	52	Tension-type headache	RCT	N/A	Aerobic activities brisk walking	Normal Routine Activity	Pain, severity, frequency (no of days), and duration
Ferragut-Garcías et al, 2017 (21)	97	Tension-type headache	RCT	19-60 years	Soft tissue mobilization of cranial muscles	Neural mobilization technique	Pain Intensity and Frequency (no of days)

Table 2 Descriptive Findings of Studies included in Analysis

Effects of physical therapy-based management approaches Analysis on the intensity of pain

The analysis of various studies revealed that physical therapy intervention demonstrated a significant improvement in reducing headache severity, according to the findings of nine randomized controlled trials. In a random effect model, the pool effects of physical therapy strategies in terms of SMD had an impact of 1.41, which according to a Cohen rule of thumb displays a larger effect of physical therapy management in decreasing pain intensity prominently among tension-type headache patients (Table 2).

The combined effects of physical therapy management strategies on pain intensity were illustrated in figure 3.

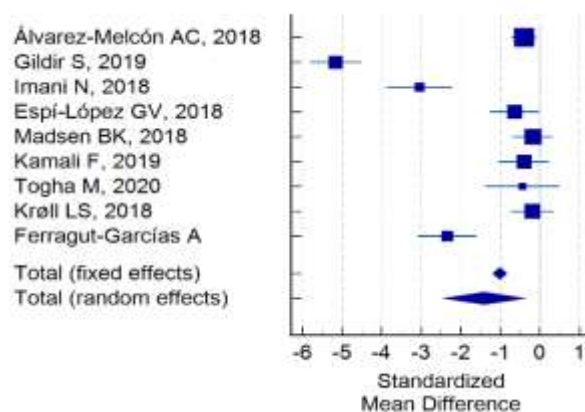


Figure 3 represents studies that significantly decrease the intensity of headaches.

Standardized Mean Difference on Pain Intensity

The combined outcome of the studies included in this analysis on pain intensity revealed an effect size of 1.41 (t value -2.664, P 0.008) suggesting a larger effect of the physical therapy-based intervention on pain intensity among tension-type headache patients. A random effect model had been used for interpretation due to the larger percentage of heterogeneity among studies as reflected by the value of $I^2 = 96.63\%$.

Study	N1	N2	Total	SMD	SE	95% CI	Weight (%)	
							Fixed	Random
Togha et al, 2020 (13)	10	9	19	-0.440	0.445	-1.378 to 0.498	4.41	10.72
Gildir et al, 2019 (14)	80	80	160	-5.164	0.329	-5.813 to -4.514	8.07	11.11
Álvarez-Melcón et al, 2018 (15)	76	76	152	-0.401	0.163	-0.723 to -0.0785	32.80	11.48
Kamali et al, 2019 (16)	20	20	40	-0.402	0.313	-1.036 to 0.232	8.89	11.15
Imani et al, 2018 (17)	25	25	50	-3.043	0.412	-3.873 to -2.214	5.12	10.84
Espí-López et al, 2018 (18)	21	22	43	-0.632	0.307	-1.252 to -0.0117	9.24	11.17
Madsen et al, 2018 (19)	30	30	60	-0.180	0.255	-0.691 to 0.332	13.37	11.30
Krøll et al, 2018 (20)	26	26	52	-0.182	0.274	-0.732 to 0.368	11.64	11.25
Ferragut-Garcías et al, 2017 (21)	25	24	49	-2.342	0.367	-3.082 to -1.603	6.46	10.99
Total (fixed effects)	313	312	625	-1.014	0.0934	-1.197 to -0.831	100.00	100.00
Total (random effects)	313	312	625	-1.410	0.529	-2.450 to -0.371	100.00	100.00
Test for Heterogeneity								
Q						237.6920		
DF						8		
Significance level						P < 0.0001		
I ² (inconsistency)						96.63%		
95% CI for I ²						95.12 to 97.68		

Table 3 Pool Effect of studies reflecting effect on pain intensity

Effect of physical therapy-based management approaches Analysis on the frequency of pain

Physical therapy intervention demonstrated a significant improvement in lowering the frequency of pain, according to the consequent finding of seven randomized controlled trials it was observed that the frequency of pain among the tension-type headache patients had been reduced as shown in forest plot Figure 4.

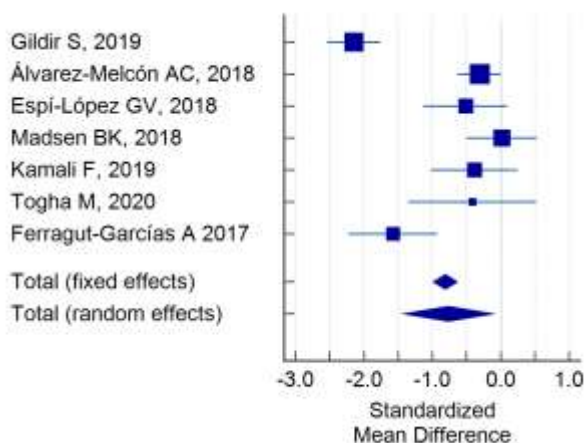


Figure 4 represents studies that significantly decrease the severity index among tension-type headaches.

Analysis of the frequency of Pain using a Standardized Mean Difference Model

The analysis revealed an effect size of -0.766 (t value -2.210 , P 0.028) which suggest a moderate level of improvement in the frequency of pain among tension-type headache patients. Random effect Model had been used for determining the pool effects due to the high percentage of heterogeneity among different studies $I^2 = 91.99$, represented in table 4.

Study	N1	N2	Total	SMD	SE	95% CI	Weight (%)	
							Fixed	Random
Togha et al, 2020 (13)	10	9	19	-0.409	0.444	-1.345 to 0.527	4.43	12.62
Gildir et al, 2019 (14)	80	80	160	-2.145	0.198	-2.535 to -1.754	22.31	15.13
Álvarez-Melcón et al, 2018 (15)	76	76	152	-0.307	0.162	-0.628 to 0.0139	33.11	15.37
Kamali et al, (2019) (16)	20	20	40	-0.378	0.313	-1.011 to 0.255	8.92	14.08
Espí-López et al, 2018 (18)	21	22	43	-0.512	0.305	-1.127 to 0.103	9.41	14.17
Madsen et al, 2018 (19)	30	30	60	0.0183	0.255	-0.492 to 0.528	13.44	14.65
Ferragut-Garcías et al, 2017 (21)	25	24	49	-1.571	0.323	-2.221 to -0.922	8.37	13.98
Total (fixed effects)	262	261	523	-0.809	0.0934	-0.993 to -0.626	100.00	100.00
Total (random effects)	262	261	523	-0.766	0.347	-1.447 to -0.0851	100.00	100.00
Test For Heterogeneity								
Q	74.9132							
DF	6							
Significance level	P < 0.0001							
I ² (inconsistency)	91.99%							
95% CI for I ²	86.06 to 95.40							

Table 4 Pool Effect of studies reflecting effect on Pain Frequency

Analysis of the effect of physical therapy-based management approaches on the duration of pain

Four studies out of 9 had determined the effects of physical therapy on the duration of pain and had provided evidence that the impact of physical therapy-based management approaches reduces the duration of pain as depicted in figure 5.

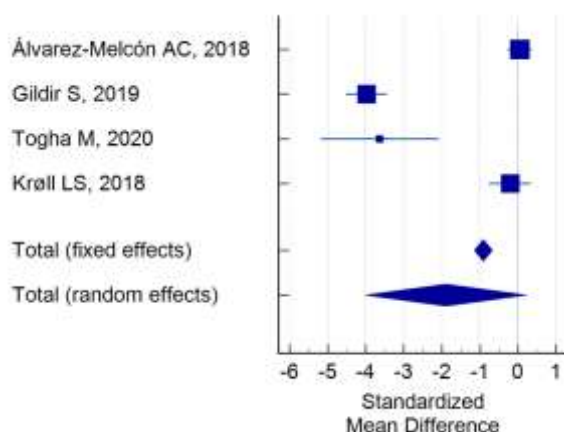


Figure 5 represents the fixed and random effects model as depicted on the forest plot

Standardized Mean Difference analysis on the duration of pain

The analysis revealed that the combined effect of studies at the random effect model showed an effect size of -1.89 (t value -1.747, P 0.081) which suggested a large effect of intervention in decreasing the duration of pain. The pool effect at random effect model was used because of the higher percentage of heterogeneity $I^2=98.36\%$ as shown in Table 5.

Study	N1	N2	Total	SMD	SE	95% CI	Weight (%)	
							Fixed	Random
Togha et al, 2020 (13)	10	9	19	-3.631	0.735	-5.181 to -2.081	2.77	23.18
Gildir et al, 2019 (14)	80	80	160	-3.981	0.273	-4.519 to -3.443	20.09	25.52
Álvarez-Melcón et al, 2018 (15)	76	76	152	0.0532	0.161	-0.266 to 0.372	57.26	25.79
Krøll et al, 2018 (20)	26	26	52	-0.204	0.274	-0.754 to 0.346	19.89	25.51
Total (fixed effects)	192	191	383	-0.910	0.122	-1.150 to -0.670	100.00	100.00
Total (random effects)	192	191	383	-1.896	1.085	-4.029 to 0.237	100.00	100.00
Test for Heterogeneity								
Q	182.9143							
DF	3							
Significance level	P < 0.0001							
I ² (inconsistency)	98.36%							
95% CI for I ²	97.36 to 98.98							

Table 5 Pool Effect of studies reflecting effect on Pain Duration

DISCUSSION

The result provided the evidence that physical therapy interventions reported in different studies including this analysis had revealed that the intensity and duration of pain had been reduced with larger effect sizes whereas the frequency of pain had been reduced with an effect size of moderate impact as estimated using a random effect model due to high percentage of heterogeneity among the studies. The findings of our analysis were according to the finding of another study in which the effects of manual therapy were determined on headaches and it was estimated in that analysis that manual therapy was found to be effective in reducing the headache disability index with an estimated effect size -4.01 however in the same study no account has been mentioned in identifying pain intensity, duration, and frequency²³.

Similarly, in another study, spinal manipulation techniques effects had been determined on migraine and it was observed that spinal manipulation had a small effect of Hedges $g = -0.34$ as identified on the frequency of pain. Further, the analysis was performed on $n=6$ RCTs²⁴. In a study conducted on determining the effects of aerobic exercises in which the studies were incorporated from the period of 1950 to 2009, it had been observed that SMD of 1.25 had been noticed on pain

intensity, SMD of 0.76 on frequency, and SMD of 0.41 on duration revealing the fact that exercises had a mild to moderate impact on relieving migraine symptoms pertinent to pain but these reviews were only limited to migraine²⁵. We in this study had come across certain good evidence that physical therapy-based management approaches including dry needling, combination exercises, mobilization, and TrPs releasing strategies were all provided findings favoring tension-type headache management through physical therapy intervention. Hence authors of this study concludes that physical therapy approaches could be a choice of intervention in the pain management of tension-type headaches.

CONCLUSION

The study has concluded that physical therapy-based management strategies as provided in several RCTs, analyzed in this review article revealed a pool effect of moderate size in managing the frequency of pain and a larger effect size in managing pain intensity and duration. Further, it was concluded that tension-type headaches can be effectively managed through physical therapy-based approaches.

AUTHORS' CONTRIBUTION:

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Aribah Ahmed

Acquisition, Analysis or Interpretation of Data: Nabeel Baig

Manuscript Writing, Critical Review & Approval: Aribah Ahmed, Dr. Ummul Kiram

All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

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INFORMED CONSENT: Written Informed Consent was taken from each patient.

CONFLICT OF INTEREST: The author(s) have no conflict of interest

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ETHICS STATEMENTS: The study has been approved by the ERC Ziauddin University in the meeting of January 2022 with the referenc code: 4541121AAREH.

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