Comparison of Craniosacral Therapy and Myofascial Relaxation Techniques in People with Migraine Headache: A Randomized Controlled Study

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Abstract

Objective: The primary objective of this study was to investigate the impact of myofascial release and craniosacral therapy on the quality of life, pain levels, and range of motion (ROM) in patients with chronic migraine headaches. The secondary aim of this study was to develop a migraine treatment protocol using current craniosacral techniques.

Methods: Patients with chronic migraine in the Neurology Department of ALKU Hospital were randomly allocated to 3 therapy groups: (1) Craniosacral Treatment Craniosacral Techniques (CST) + Medical Treatment (MT) (CST group) (n = 24), (2) myofascial treatment (MFT) (n = 24) + MT (MFT group), and (3) MT (control group) only (n = 26). Visual Analog Scale (VAS) for pain, FONSECA for temporomandibular disorder symptom intensity, 24 Hours Quality of Life Questionnaire Scales for quality of life, and Migraine Disability Assessment Score for impairment, Goniometer for Cervical ROM were used for the disability level. Follow-up scores were collected 4 times: at pretreatment (T0), immediately post-treatment (T1), 1 month (T2), and 3 months after treatment ended (T3).

Results: Changes were found in T0 to T1 treatment results, VAS, and ROM angles between the groups. In intragroup evaluations, 24 Hours Quality of Life Questionnaire changes were observed only in the CST group at T0 to T1 to T2 periods (P = .011) while Migraine Disability Assessment Score scores were significantly changed in all groups. Significant changes were also observed in both VAS scores and FONSECA scores of the CST and MFT groups whereas VAS scores decreased significantly, especially in the T0 to T1 to T2 to T3 periods (P < .05). In the evaluation of FONSECA scores both within and between groups, it was observed that the most significant decrease was in the T2 period and there was a difference between the groups (P = .015).

Conclusion: For the participants in this study, CST and MFT techniques reduced migraine headache, temporomandibular disorder level, drug consumption, and functional disability levels, and increased cervical region ROM. These results suggest that CST techniques could be considered in migraine treatment as one of the clinical practical applications within the framework of a certain protocol. (J Chiropr Med 2024;23;114-126)

Key Indexing Terms: *Migraine Disorders; Quality of Life; Manual Therapy*

Introduction

Migraine is the second most common primary headache disorder and the third most common cause of disability in individuals under 50 years of age in the world which still not sufficiently treated due to underdiagnosis.[1] Migraine causes considerable physical dysfunctions and emotional mood disorders that might affect the quality of daily life.[2]

Chronic pain problems such as migraine led to increased sympathetic activity.[3] Migraine stimulates the nociceptors on the vascular system, myofascial system, central and peripheral nervous system.[4] Central sensitivity, plays an important role in, in affecting the nervous, sensory, motor, and cognitive systems. Thereby leading to functional changes in key centers that are manipulable with some palpation, and soft tissue techniques.[5,6] Soft tissue manual

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techniques aim to relax and normalize myofascial structures. It has been proven that these techniques lead to physical relief from the alpha channel by absolute power, quantitative electroencephalography.[7,8]

Craniosacral Techniques (CST) are one of the methods in the literature used to treat headache and migraine.[9,10] CST in the trigeminovascular region of the central nervous system aims to reduce pain intensity, number of days, duration of attacks, disability, and medication intake.[11,12] CST is effective in normalization of the craniosacral rhythm with correct restraints applied on the paraspinal tissue and fascia using soft hand techniques.[11,12]

Patients with migraine often complain about neck pain and it usually worsens the headaches. Individuals with neck pain usually have reduced cervical range of motion (ROM).[13] Trigger Points in the upper trapezius (UT), sternocleidomastoid and suboccipital muscles, and active trigger points in the craniocervical junction and neck can trigger migraine headache problems.[13,14]

There are studies showing that migraine attacks are associated with trigger points in the masticatory muscles that cause myofascial pain.[15] Studies showed that temporomandibular disorder (TMD)-related headache triggers migraine attacks in individuals with migraine.[16] In addition, TMJ exercises applied in addition to physiotherapy applications given together with aerobic exercises may be effective in patients with migraine.[17,18]

Previous studies have suggested that soft tissue techniques may be beneficial in patients with migraine in terms of pain and frequency of onset[19] and migraine effect.[20] In fact, we have previously reported that a protocol based on soft tissue and cranial techniques can be effective in reducing pain, frequency of onset, functional disability, and drug use in people with migraine.[10,21,22] But no study was found comparing CST and myofascial treatment (MFT) in migraine.

Based on these studies we hypothesized to reduce migraine-induced symptoms through craniosacral and myofascial release techniques and to compare the effects of these two techniques on migraine symptoms and drug use. The primary objective of this study was to investigate the impact of myofascial release and craniosacral therapy on the quality of life, pain levels, and ROM in patients with chronic migraine headaches. The secondary aim of this study was to develop a migraine treatment protocol using current CST.

Methods

Ethics

This randomized controlled study was approved by the ethics committee of Alanya Alaaddin Keykubat University (No: 10354421-2021/03-13). Before starting the study, all participants were informed verbally and in writing about the study in accordance with the Declaration of Helsinki. Written informed consent was obtained from the participants. The study was registered at www.ClinicalTrials.gov (identifier: NCT04976725). We adhered to the CONSORT reporting guidelines for pilot and feasibility studies.[23]

Study Design

A parallel group randomized controlled study was conducted with assessment points pretreatment (T0), immediately post-treatment (T1), 1 month after treatment (T2), and 3 months after treatment. The treatment arms were set as (1) Craniosacral Treatment CST + Medical Treatment (MT) (CST group) ($n = 24$), (2) MFT ($n = 24$) + MT (MFT group), and (3) MT (control group) only ($n = 26$).

Inclusion and Exclusion Criteria and Search Strategy

The inclusion-exclusion criteria and the criteria for diagnosing migraine were determined by a neurologist according to the ICHD-3 criteria.[24] All treatment techniques were performed by an osteopath with 8 years of osteopathy experience. Age, gender, drug use, and headache frequency, migraine history of the patients participating in the study were recorded using the demographic information form.

Inclusion criteria[10,21] for the study included people who

(1) were between the ages 18 to 65.
(2) One or more years of migraine history with 4 or more attacks per month were included in the study; headache medication regimens should be stabilized for 4 weeks prior to enrollment.
(3) have persistent headache due to migraine lasting 15 days or longer per month for 3 consecutive months and do not respond to any medication.

Exclusion criteria[10,21] are people who

(1) have secondary headaches other than migraine;
(2) have psychiatric disorders;
(3) are postmenopausal women;
(4) undergoing pharmacological adaptation;
(5) have experienced one of the alternative treatment methods for migraine pain, such as acupuncture, massage, biofeedback, etc. in the last 6 months.

Randomization Methods

Distribution of subjects was performed using random computer number generator R software by a researcher who was not involved in the evaluation or treatment of participants[25]; Group 1; CST + drug treatment (CST group) ($n = 29$), Group 2; MFT ($n = 29$) + drug treatment (MFT group) and Group 3; drug treatment only (control group) ($n = 29$).

Concealment

The participants and the researcher who performed the statistical analysis were not aware of the group assignments throughout the intervention. However, due to the nature of the Study and the practitioner's experience, both treatment modalities were administered by the same person.

Block Randomization

In this study, as mentioned above, random computer number generator R software randomization[25] was used. However, due to the eligibility criteria, no blocking or stratification was used.

Sample Size

The study by Ferragut-Garcías et al,[20] which has a strong effect size obtained especially in pain intensity results, was taken as reference ($f = 1.05$). In the power analysis made by taking into consideration that a lower level of effect size can be obtained ($f = 0.4$), it was calculated that 80% power can be obtained at a 95% confidence level when there are at least 66 people (at least 22 people for each group were included in the study).

Recruitment

This study was carried out on outpatients admitted to Alanya Alaaddin Keykubat University Hospital Neurology Department between August 2021 and April 2022. Patients diagnosed with migraine by a neurologist were included in the study. Initially, 90 patients diagnosed with migraine were included in the study. The patients were informed about the treatment protocols, participation was based entirely on the declaration of Helsinki. Treatment techniques were applied by an osteopath with 8 years of osteopathy experience.

Interventions

This study was based on the study of Herranz-Gómez et al,[21] which included craniosacral CV4 techniques applied twice a week for 4/6 weeks and for 10 to 30 minutes in patients with migraine.[21] Accordingly, in our study, both MFT and CST applications were applied in a total of 8 sessions, 2 days a week for 4 weeks, with a session duration of 20 to 30 minutes. CST and MFT treatment sessions lasted for 20 to 30 minutes and administered as 2 sessions a week with duration of 4 weeks.

Group I: CST

The CST included Craniosacral rhythm still point induction technique, releasing connective tissue of the chest and the abdominal cavity, frontal lift, temporal lift, sphenobasilar compression-decompression, mobilizing the temporal bone, mobilizing the temporal bone, temporal decompression, temporomandibular joint compression and decompression, suboccipital inhibition—dura mater release, fourth ventricle compression (CV-4)[17-26,27] (Supplementary File I). Osteopathic evaluation and treatment criteria have been determined and applied based on asymmetrical changes in tissue, soft tissue changes, ROM, and sensitivity parameters. Each session lasted an average of 20 to 30 minutes.

Group 2: Myofascial Techniques

The myofascial release technique provides relaxation at the trigger points by applying the ischemic compression. According to the patient's statement, ischemic compression is applied until the pain at the active trigger point disappears and relaxation is felt in the muscle in connection with the therapist's hand experience.[28] The aim of this technique is to improve local blood flow and supplying oxygen to the muscle.[29,30] The MFT includes trigger point relaxation of the UT Muscles Suboccipital Muscles[12] and Sternocleidomastoid Muscles[29] (Supplementary File II). Each session lasted an average of 20 to 30 minutes.

Group III: Control Group (MT)

According to many evidence-based medications are available for the acute treatment of migraine, including triptans, ergotamine derivatives, NSAIDs, nonopioid analgesics, and analgesic combinations, as well as the newer Gepants and Ditans. The patients included in the control group were asked to follow the regular drug regimens determined by the neurologist according to the Consensus Statement of the American Headache Society, and not to change the frequency and dose unless necessary.[31]

Measures and Data Collection

Data collection was conducted from February 2021 and August 2021.

Outcome Measures

24 Hours Quality of Life Questionnaire (24-Hqolq).

The 24-Hqolq evaluates the quality of life with 15 parameters, including 5 subparameters (range: 15-105), including work functionality, social functionality, energy and vitality, emotions and anxiety, and migraine symptoms, and aims to determine short-term migraine symptoms. Items in the scale are scored with a 7-stage grading method. The subscore for each item ranges from 1 to 7. A minimum of 3 and a maximum of 21 subpoints can be obtained from each quality of life subparameter. The total

score is a minimum of 15 and a maximum of 105. The higher the individual scores obtained from the scale, the higher the quality of life, and the lower the score, the lower the quality of life.[32-34]

Visual Analog Scale. Visual Analog Scale (VAS) is used to determine the severity of pain.[34] Patients were asked to mark the severity of pain on a 100 mm long, straight line defined from "I have no pain" (0 points) to "Unbearable pain" (10 points).

Headache-Related Disability. The level of disability caused by the disease was measured with the Migraine Disability Assessment Score (MIDAS). MIDAS consists of 7 items and evaluates the number of days in the last 3 months that patients did not go to work/school due to headache, decreased functionality at work/home, or could not perform social activities.[35,36]

Fonseca. Fonseca Anamnestic Index shows the severity of TMD at 4 different points. This questionnaire allows classification of severity of TMD to none (0-19 points), mild TMD (20-49 points), moderate TMD (50-69 points), and severe TMD (70-100 points).[37] Validity of the Fonseca Anamnestic Index was established with high level of accuracy based on the Research Diagnostic Criteria for TMDs.[37]

Cervical Region ROM. A mechanical goniometer was used to assess cervical ROM.[38] Measurements were performed in a sitting position on a fixed chair. The assessor placed the goniometer starting point at 7th cervical vertebrae spinous process. Patients were asked to move their heads to flexion, extension, right, and left rotation directions without using their bodies. The angle was measured by observing the change of the tragus point.

Statistical Analyses

SPSS 25.0 (IBM SPSS Statistics 25 software: IBM Corp) was used for statistical analyses of the data. Continuous variables are presented as mean ± standard deviation, median (minimum to maximum values), and categorical variables are presented as number and percent. To determine the normal distribution of the data, the "Shapiro—Wilk test" was used. One-way analysis of variance (post hoc: Tukey test) was used in comparing the independent group differences when the parametric test assumptions were provided, and Kruskal−Wallis Variance analysis (post hoc: "Mann−Whitney U" test with Bonferroni method) was used in comparing the independent group differences when the parametric test assumptions were not provided. Repeated measures ANOVA (post hoc: Bonferroni method) was used in comparing the dependent group differences when the parametric test assumptions were provided, and the Friedman test (post hoc: Wilcoxon signed rank test with Bonferroni Correction) was used when the parametric test assumptions were not provided. Statistical significance was determined as $P < .05$.

Results

Our study started with 90 people diagnosed with migraine by a neurologist. However, since 1 person was diagnosed with different types of headache and 2 people did not accept any treatment, they were not included in the study. The remaining 87 people were randomized to include 29 people in 3 groups. During the study, 5 people from the CST group (n = 24), 5 people from the MFT group (n = 24), and 5 people from the control group (n = 26) were excluded because they did not participate in the treatment programs regularly (Fig. 1). Therefore, this study was completed with a total of 74 patients.

Evaluation of Intergroup and Intragroup

24-Hqolq. 24-Hqolq results were similar in between-group comparisons ($P \geq .05$). With-in group comparisons show that CST group was significantly lower compared to the pretreatment (T0) values ($P = .011$*). However, there was no significant change in the MFT and control groups ($P \geq .05$) (Table 1).

Migraine Disability Assessment Score. It was observed that there was no difference between the MIDAS Scale scores of the 3 groups ($P \geq .05$) (Table 1). However, within the groups themselves; It was observed that the MIDAS score of the CST group in the 1st month (T2) results decreased compared to the pretreatment (T1) results ($P = .025$*). It was observed that there was a significant decrease in both the 1st (T2) and 3rd (T3) month measurements of the MFT group compared to the pretreatment measurements ($P = .0001$*). In the control group, there was a statistical decrease compared to the post-treatment values at 3 months ($P = .0001$*) (Table 1).

Pain Level. VAS results were found to be significantly different between the 1st and 3rd month measurement values after the treatment ($P = .001$*). It was found that the values of the control group were significantly higher than the values of the CST and MFT groups in particular. There was no difference in pretreatment (T0) values between the 3 groups ($P = .225$). However, within the groups, there was a significant decrease in VAS scores at 1 month (T2) and 3 months (T3) after treatment in CST and MFT groups ($P = .001$*) (Table 1).

Fonseca. The pretreatment (T0) Fonseca score of the CST group was statistically lower than the control group. However, CST and MFT Groups were found to be higher pretreatment (T0) and 1 month (T2) after treatment ($P = .015$*) (Table 1).

Range of Motion. Pretreatment (T0) and post-treatment 3rd month (T3) neck flexion values were found to be similar in the 3 groups ($P \geq .005$). Neck flexion ROM values were observed to increase the most in the CST group immediately post-treatment (T1) compared to all groups. In the 3rd month after treatment (T3), it was observed that the

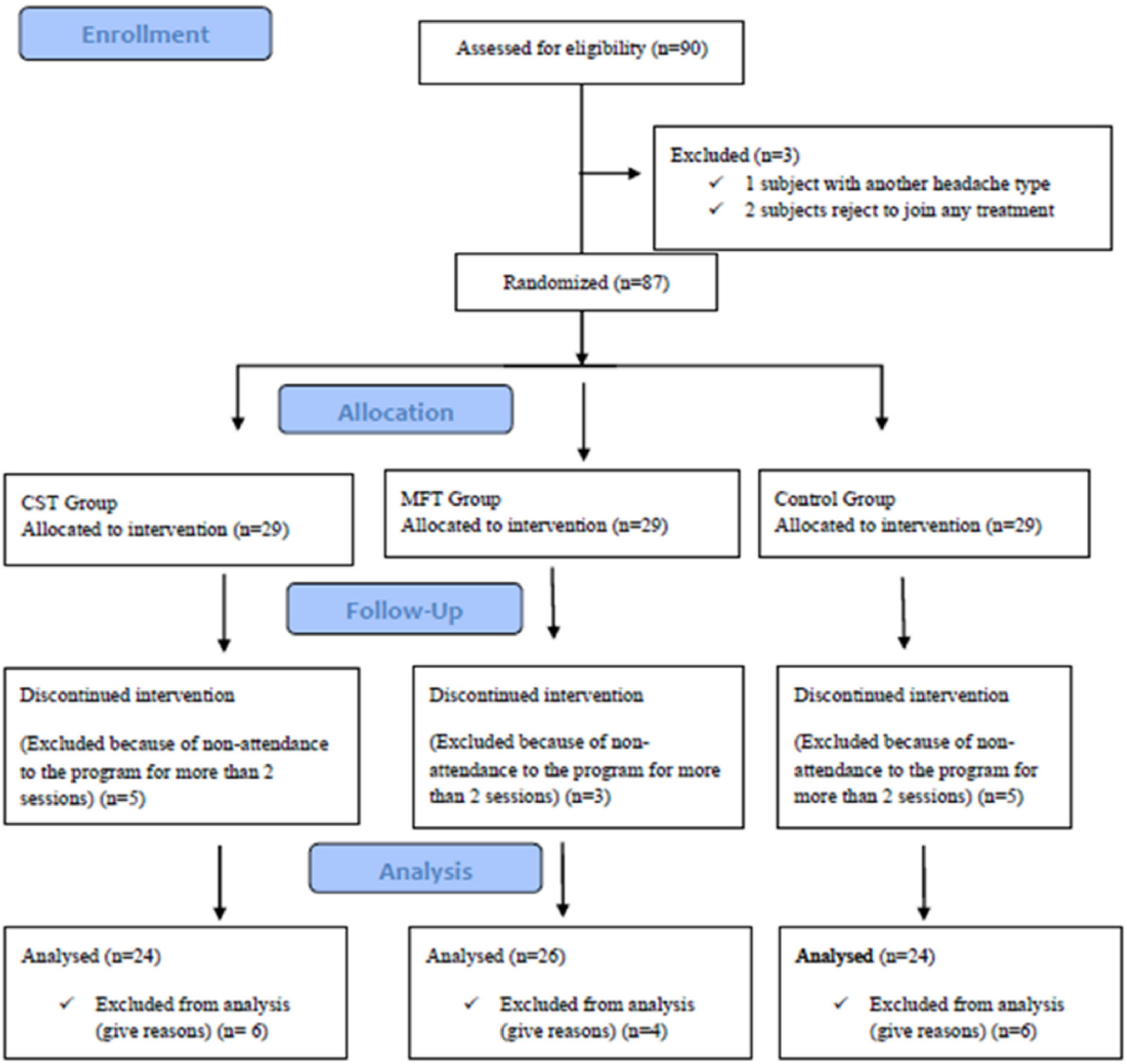

Fig 1. *Flowchart according to CONSORT statement for the report of randomized trials.*

change in both CST and MFT groups was higher than the control group ($P = .002$*) (Fig. 2).

The pretreatment (T0) neck extension value was similar in all 3 groups. It was observed that the extension angle of the CST group increased more than before the treatment (T0), immediately after the treatment (T1), and at the 1st month after the treatment (T2) compared to the control group. Although there were changes in the MFT group, it was concluded that the highest increase was in the CST group (Fig. 2).

A regular increase was observed in all measurements of the MFT group. However, it was determined that the increase in the angular value in all measurements in the CST group was higher than in both the MFT and control groups. No increase was observed in the control group (Fig. 2).

An increase in left lateral flexion angle was observed immediately pretreatment in both the MFT and CST groups. This increase continued with a decrease in the 3rd month measurements (T3). However, no change was observed in any of the measurements of the control group (Fig. 2).

It was observed that both CST and MFT groups had the highest change in both left and right cervical rotation angles immediately pretreatment. On the other hand, it was observed that the change was preserved in the 1st month after treatment (T2) and 3rd-month after treatment (T3). However, no change was observed in the

Table 1. *Assessment of Differences With Intragroup Evaluation Before Treatment, After Treatment, First And 3rd Month After Treatment*

Delta (Assessment of Differences) (T0-T1)	CST	MFT	Control	Intergroup *P*
24-Hqolq	−10.92 ± 20.68	2.46 ± 20.55	0.96 ± 3.46	.068 (kw = 5.371)
	−0.5 (−73 to 11)	0 (−46 to 49)	0 (−2 to 15)	
MIDAS	0.54 ± 23.16	12.92 ± 35.7	3.13 ± 7.15	.091 (kw = 4.803)
	0.5 (−93 to 28)	5 (−55 to 82)	0 (0-30)	
VAS	2.88 ± 2.98	2.65 ± 1.92	0 ± 0	.0001[a] (kw = 29.279) (b. c)
	2 (0-10)	3 (−2 to 6)	0 (0-0)	
Cervical flexion	−6.25 ± 8.24	−1.15 ± 7.52	0 ± 0	.002[a] (kw = 12.923) (a. b)
	−5 (−25 to 10)	0 (−20 to 10)	0 (0-0)	
Cervical extension	−7.92 ± 9.66	−3.08 ± 9.81	0 ± 0	.003[a] (kw = 11.966) (b)
	−2.5 (−25 to 0)	0 (−30 to 20)	0 (0-0)	
Cervical lateral flexion right	−5 ± 6.08	−2.5 ± 4.74	0 ± 0	.001[a] (kw = 14.719) (b)
	−5 (−20 to 0)	0 (−15 to 5)	0 (0-0)	
Cervical lateral flexion left	−3.54 ± 6.67	−3.27 ± 7.34	0 ± 0	.002[a] (kw = 12.093) (b. c)
	0 (−25 to 10)	−5 (−25 to 15)	0 (0-0)	
Cervical rotation right	−8.13 ± 13.34	−4.81 ± 12.2	0 ± 0	.01[a] (kw = 9.168) (b. c)
	−2.5 (−40 to 10)	−5 (−45 to 25)	0 (0-0)	
Cervical rotation left	−8.75 ± 11.54	−3.08 ± 8.73	0 ± 0	.0001[a] (kw = 18.335) (b)
	−5 (−30 to 20)	0 (−20 to 20)	0 (0-0)	
Fonseca	12.5 ± 21.92	1.42 ± 27.27	0 ± 0	.216 (kw = 3.066)
	2.5 (−20 to 60)	2.5 (−83 to 40)	0 (0-0)	
Delta (assessment of differences) (T1-T3)	CST	MFT	Control	Intergroup *P*
24-h MQoLQ	−0.08 ± 13.42	−2.27 ± 13.76	−1.38 ± 3.63	.262 (kw = 2.682)
	0 (−38 to 37)	0 (−35 to 49)	0 (−15 to 2)	
MIDAS	0.21 ± 25.62	6.27 ± 42.04	−3.96 ± 7.93	.401 (kw = 1.829)
	0 (−88 to 58)	0 (−87 to 141)	0 (−30 to 0)	
VAS	0.17 ± 1.31	0.08 ± 2.02	0 ± 0	.864 (kw = 0.293)
	0 (−2 to 3)	0 (−5 to 5)	0 (0-0)	
Cervical flexion	1.25 ± 4.95	−0.77 ± 3.37	0 ± 0	.261 (kw = 2.689)
	0 (−5 to 20)	0 (−10 to 5)	0 (0-0)	
Cervical extension	0.63 ± 5.77	−1.15 ± 8.28	0 ± 0	.81 (kw = 0.422)
	0 (−10 to 20)	0 (−30 to 15)	0 (0-0)	

(*continued*)

Table 1. (*Continued*)

Delta (assessment of differences) (T1-T3)	CST	MFT	Control	Intergroup *P*
Cervical lateral flexion right	0.42 ± 1.41	−0.38 ± 3.44	0 ± 0	.503 (kw = 1.373)
	0 (0-5)	0 (−15 to 5)	0 (0-0)	
Cervical lateral flexion left	0.21 ± 3.12	0.38 ± 2.8	0 ± 0	.442 (kw = 1.634)
	0 (−10 to 10)	0 (−10 to 5)	0 (0-0)	
Cervical rotation right	0.21 ± 5.41	−1.35 ± 7.56	0 ± 0	.828 (kw = 0.377)
	0 (−10 to 20)	0 (−30 to 10)	0 (0-0)	
Cervical rotation left	0.83 ± 5.04	0.38 ± 4.67	0 ± 0	.796 (kw = 0.456)
	0 (−5 to 20)	0 (−15 to 10)	0 (0 to 0)	
Fonseca	1.88 ± 19.1	4.42 ± 22.46	3.33 ± 7.02	.661 (kw = 0.829)
	0 (−35 to 55)	0 (−30 to 80)	0 (0-25)	

[a] $P < .05$ statistically significant; all descriptive statistics are expressed as mean ± standard deviation; median (minimum to maximum values); kw: Kruskal−Wallis variance analysis; a: significant difference between CST and MFT groups; b: significant difference between CST and control groups; c: Significant difference between MFT and control groups; between baseline (T0) measurement to İmmediately after treatment (T1); immediately after treatment (T1) measurement—3rd month measurement (T3).

rotation angles in both directions of the control group (Fig. 2).

Evaluation of Differences With Intergroup

It was observed that there was a difference between the groups in pretreatment (T0) and immediate post-treatment (T1) VAS, cervical ROM angle values in each direction (*$P < .05$) (Table 2). Cervical ROM angles in all directions of the CST group were found to be significantly higher than both the MFT and control groups. VAS values of both CST and MFT groups were found to be significantly higher than the control group. However, there was no difference between the groups in the 24-Hqolq, MIDAS, and Fonseca Scores.

No difference was found between the Immediate post-treatment (T1) and 3rd-month post-treatment values (T3) in any of the parameters evaluated between the groups (Table 2).

Discussion

In comparing the effects of CST + medication treatment (CST group), MFT + medication treatment (MFT group), and only drug treatment (control group) on cervical ROM, pain, and TMD and the relationships between these variables in patients with migraine we found that decrease in VAS pain scores in both CST and MFT groups while the most significant reduction rate in VAS scores was observed in right after post-treatment (T1) in the both groups. Furthermore, this decrease was maintained at the same rate at other measurement times and there was a significant increase in cervical ROM angles. However, in focusing on the within-group evaluations, 24-Hqolq change was observed only in the CST group at pretreatment (T0)—right after post-treatment (T1)—1 month after post-treatment (T2) ($P = .011$). It was observed that there was a significant change in MIDAS scores of all groups while a significant decrease in both VAS scores and FONSECA scores of the CST and MFT groups ($P < .05$) were observed. In the evaluation of FONSECA scores both within and between groups, it was observed that the most significant decrease was in the 1 month after treatment (T2) and there was a difference between the groups ($P = .015$).

There are few studies in the literature that use osteopathy, craniosacral treatment techniques and measure the effectiveness of myofascial release techniques on migraine. Although measurements were taken at different times, it was observed that soft tissue techniques were effective on migraine, as in our study.[28,39-41]

1. 24-Hqolq and pain severity

In this study, unlike the literature, 24-Hqolq was used to specifically measure quality of life, and VAS was used to assess pain.[19,39-41] In line with previous studies we showed that only CST is effective in parameters affecting migraine level such as the amount of drug consumption, functionality, disability level, trigger point levels in the cervical muscles, it is difficult to come to a definitive conclusion

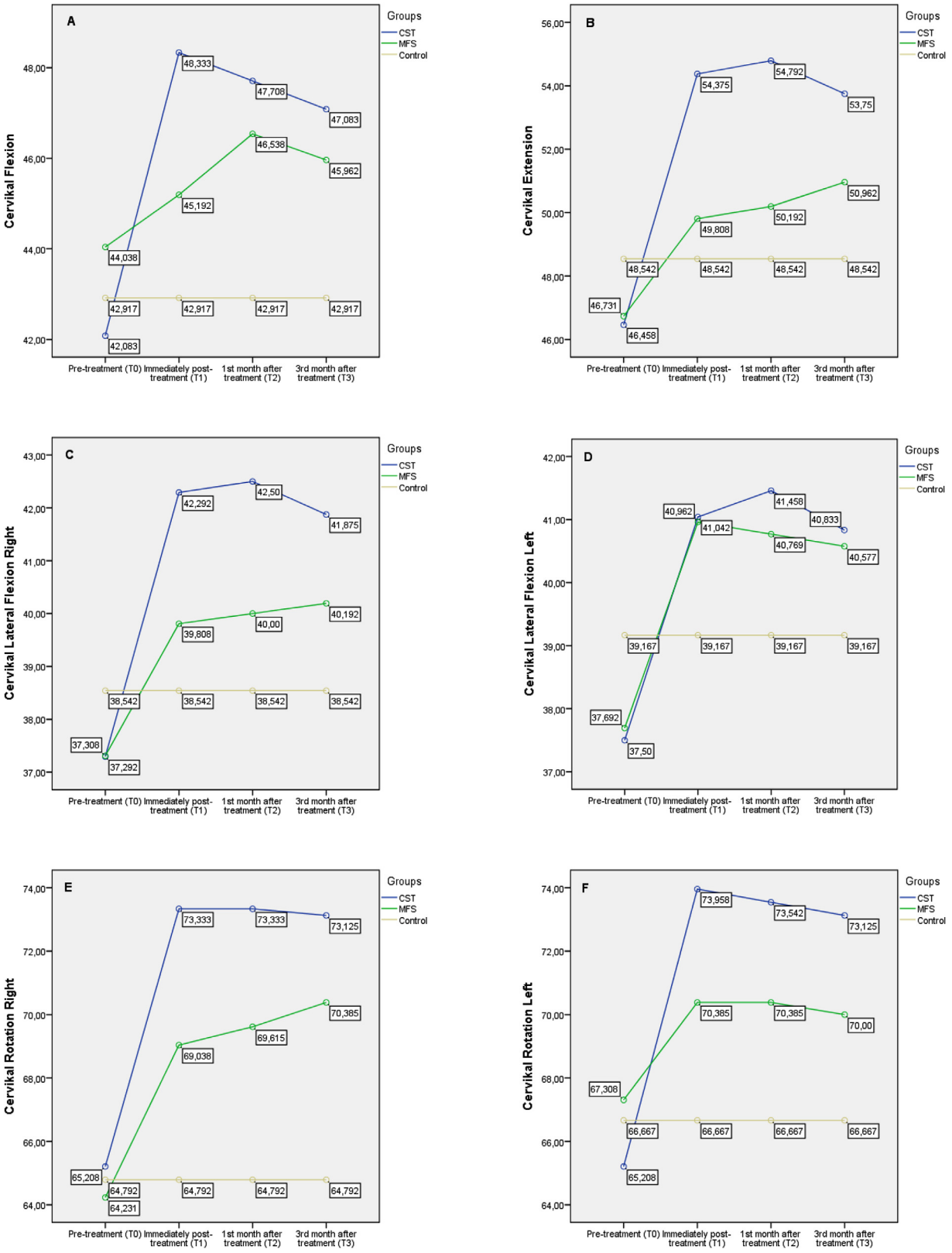

Fig 2. *Cervical ROM change chart: Cervical Flexion (A), Cervical Extension (B), Cervical Lateral Flexion Right (C), Cervical Lateral Flexion Left (D), Cervical Rotation Right (E), Cervical Rotation Left (F).*

Table 2. *Assessment of Differences with Before and After Treatment*

		CST (1)	MFT (2)	Control (3)	Intergroup *P*
24-Hqolq	T0	33.92 ± 10.7	41.88 ± 17.76	35.17 ± 11.74	.097
		33.5 (4-54)	40 (15-82)	33.5 (4-64)	(*F* = 2.407)
	T1	44.83 ± 21.28	39.42 ± 18.96	34.21 ± 11.58	.351
		36.5 (22-105)	36.5 (14-99)	33.5 (4-64)	(kw = 2.093)
	T2	45.75 ± 25.88	40.88 ± 19.95	34.21 ± 11.58	.268
		37.5 (2-105)	40 (15-102)	33.5 (4-64)	(kw = 2.634)
	T3	44.92 ± 25.74	41.69 ± 17.01	35.58 ± 11.44	.474
		36 (8-105)	38 (14-88)	33.5 (4-64)	(kw = 1.491)
	Intragroup *P*	.011[a] (fr = 11.082) (*β*)	.182 (fr = 4.864)	.194 (fr = 4.714)	
Midas	T0	33.13 ± 29.78	46.19 ± 43.96	35.46 ± 30.23	.424
		24 (1-110)	39 (1-216)	31 (1-110)	(kw = 1.714)
	T1	32.58 ± 38.23	33.27 ± 48.1	32.33 ± 26.79	.606
		20 (0-168)	21.5 (0-212)	29.5 (0-90)	(kw = 1.001)
	T2	27.21 ± 34.13	23.85 ± 20.87	32.58 ± 26.78	.42
		20 (0-140)	21 (0-63)	31 (0-90)	(kw = 1.735)
	T3	32.38 ± 35.28	27 ± 22.19	36.29 ± 31.08	.675
		23.5 (0-140)	22.5 (0-90)	31 (1-116)	(kw = 0.787)
	Intragroup *P*	.025[a] (fr = 9.307)	.0001[a] (fr = 20.004)	.0001[a] (fr = 22.099)	
		(*β*)	(*α*. *β*. *γ*)	(*ε*)	
Vas	T0	8.5 ± 1.41	8.69 ± 1.67	8.04 ± 1.68	.225
		9 (5-10)	10 (5-10)	9 (5-10)	(kw = 2.987)
	T1	5.63 ± 2.72	6.04 ± 1.93	8.04 ± 1.68	.001[a]
		6 (0-10)	6 (2-10)	9 (5-10)	(kw = 14.508) (b. c)
	T2	5.46 ± 2.41	5.77 ± 1.77	8.04 ± 1.68	.0001[a]
		6 (2-9)	6 (2-10)	9 (5-10)	(kw = 18.39) (b. c)
	T3	5.46 ± 2.25	5.96 ± 1.75	8.04 ± 1.68	.0001[a]
		6 (2-9)	6 (3-9)	9 (5-10)	(kw = 18.168) (b. c)
	Intragroup *P*	.0001[a] (fr = 32)	.0001[a] (fr = 38.826)	1 (fr = 0)	
		(*α*, *β*, *γ*)	(*α*, *β*, *γ*)		

(*continued*)

Table 2. (*Continued*)

		CST (1)	MFT (2)	Control (3)	Intergroup *P*
Fonseca	T0	46.91 ± 28.32	43.54 ± 20.95	46.67 ± 22.2	.783 (kw = 0.489)
		50 (10-90)	45 (2-70)	50 (0-85)	
	T1	34.17 ± 21.8	42.12 ± 20.5	46.67 ± 22.2	.072 (kw = 5.267)
		25 (10-95)	40 (15-85)	50 (0-85)	
	T2	28.75 ± 14.39	35.38 ± 14.96	43.33 ± 19.98	.015[a] (kw = 8.423) (b)
		27.5 (10-50)	35 (5-70)	45 (0-75)	
	T3	32.29 ± 20.59	37.69 ± 17.85	43.33 ± 19.98	.087 (kw = 4.883)
		25 (10-85)	37.5 (5-70)	45 (0-75)	
	Intragroup *P*	.017[a] (fr = 10.226) (β)	.012[a] (fr = 10.928) (β)	-	

[a] $P < .05$ statistically significant; all descriptive statistics are expressed as mean ± standard deviation; median (minimum to maximum values); *F*: one-way analysis of variance; kw: Kruskal−Wallis variance analysis; fr: Friedman test; a: significant difference between CST and MFT groups; b: significant difference between CST and control groups; c: significant difference between MFT and control groups; α: significant difference between baseline (T0) measurement—immediately after treatment (T1); β: significant difference between baseline measurement (T0)—1st month treatment (T2); γ: significant difference between first (T2)—3rd month after treatment (T3); δ: significant difference between baseline treatment (T1)—1st month measurement (T2); ε: significant difference between immediately after treatment (T1) measurement—3rd month measurement (T3); ζ: significant difference between 1st month after treatment (T2) measurement—3rd month after treatment (T3) measurement.

that CST applications alone are effective in reducing the functional disability level of migraine patients which agree with previous data.[19,34,40,42] For instance, Mann et al,[41] revealed that craniosacral treatment protocol reduced frequency of migraine similar to our results although their study protocol (the study protocol of those) differed in some aspects from our study, such as the longer study protocol and less frequent application.

In contrast to the literature, specifically, pain was evaluated with VAS. Generally, the rate of use of HIT-6 score is higher than VAS to measure headache severity and quality of life together in migraine[39,40] while the effectiveness of the treatments was found to be similar to our study. For instance, Voigt et al [39] examined the effectiveness of Osteopathic Manipulative Treatment (OMT) on pain, migraine attacks, and quality of life in female patients with migraine. In their interesting study, they stated that OMT reduced pain and migraine attack days and improved quality of life. According to Arnadottir et al[40] who applied CST 2 days a week for 12 weeks to individuals aged 20-50 years with at least 2 migraine attacks per month by evaluating pain and quality of life with HIT-6 score-(compared to VAS in our study)-found a similar and significant reduction in pain as in our study. However, Muñoz-Gómez et al[42] examined the efficacy of CST by forming a similar 3 randomized groups comparing CST, sham CST, and medication groups, in contrast ours, consisting of CST, MFT, and medication groups. The advantage of our study seems that it examines the effect of CST over the MFT method, which is often used in the treatment of headache or migraine. Nevertheless, in both studies, CST treatments were found to be effective on migraine. It is reasonable to assume that reduction of proinflammatory substances as well as soft tissue techniques based on myofascial trigger point therapy and stretching could be responsible for the role of both CST-(one of the Osteopathic Manipulative Treatment (OMT) Techniques) and MFT in reducing the pain severity and frequency.[28,43,44]

2. Questionnaire MIDAS

In line with other studies comparing myofascial release techniques, disability caused by migraine was also measured with MIDAS.[28,41] For example, Espí-López et al[28] compared MFT 2 different myofascial release technique while treatment effect was measured with MIDAS. Although the applications are performed at a longer frequency and in a longer time compared to our study, the total number of treatments was in a shorter duration than our study, and the last measurement was undertaken 1 month after the treatment. In contrast to our 3-month long-term control results, they presented short-term therapeutic data which indicated that MFT and stretch-based soft tissue techniques are more effective when combined with sub-occipital soft tissue inhibition which fit well with our study results.

3. FONSECA total scores

TMD includes several types of headaches, and migraine is the most common headache type associated with this usual condition associated with migraine.[44] Studies investigated the severity of TMDs and the magnitude of their association with migraine using the Fonseca Anamnestic

Index[45,46] which revealed that the severity of TMD signs and symptoms was related to migraine severity rather than frequency, and the relationship was higher in chronic migraine. It was observed that patients in all groups included in our study had mild TMD problems according to FONSECA total scores which decreased significantly in both CST and MFT groups in terms of FONSECA total scores after treatment, suggesting that both MFT and CST treatments are effective in TMD.

4. Cervical ROM

Previous studies have investigated the effect of classical physiotherapy techniques on individuals with migraine.[47-49] One of the factors that negatively affect the severity of migraine pain has been reported as the neck pain. Although there are few studies investigating cervical ROM in individuals with neck pain in general, there is generally a negative relationship between these 2 factors[50] as was also suggested with our results. For instance, Oliveira-Campelo et al[49] found the beneficial effects of various manual techniques and applied muscle energy technique, passive stretching, and ischemic compression techniques on cervical ROM and pressure pain sensitivity in individuals with TrP in the UT muscle. Also, another study comparing the mobility of neck and back flexor and extensor muscle chains with the Lindemann-Bousquet technique in women diagnosed with migraine (n = 24), chronic migraine (n = 36) and without headache (n = 27) showed hypomobility symptoms predominantly distributed in neck and back extensor muscle chains and back flexor chains in women with migraine and chronic migraine[51] which led to the hypothesis that hypermobility might negatively affect cervical ROM. Considering the fact that migraine is a disease of OSS in which the tension reaches the suboccipital via myodural bridges affecting the length of the extensor chain in the suboccipital muscles, it is pathophysiologically reasonable that the limitation in one area may lead to further related limitations in the surrounding tissues due to strict myofascial connections. "Theoretically it can be concluded that CST and MFT treatments may be" effective on cervical ROM because they create relaxation in the dura mater and suboccipital areas.[51]

Limitations

First, the characteristics of the study patients were mostly women, which could have led to a possible bias in the results "since studies have found TMD disproportionately affects the female gender." Another limitation is the short duration of treatment and the small sample size. Without a large sample size it is difficult to isolate if subgroups might respond better to CST, MFT, or a combination. Also with the multiple types of migraine presentations, it is difficult to fully extrapolate these findings without further studies. In future studies, it is recommended to investigate the effect of CST and soft tissue techniques with a longer treatment period and in larger sample size.

Conclusion

For the participants in this study, CST and MFT techniques reduced migraine headache, TMD level, drug consumption, and functional disability levels, and increased cervical region ROM. These results suggest that CST techniques could be considered in migraine treatment as one of the clinical practical applications within the framework of a certain protocol.

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jcm.2024.08.010.

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Contributorship Information

Concept development (provided idea for the research): A.A.
Design (planned the methods to generate the results): A.A., B.Y.
Supervision (oversight, organization, and implementation): A.A., A.Ö.
Data collection/processing (experiments, organization, or reporting data): A.A., A.Ö.
Analysis/interpretation (analysis, evaluation, presentation of results): A.A.
Literature search (performed the literature search): A.A.
Writing (responsible for writing a substantive part of the manuscript): A.A., A.Ö., B.Y.
Critical review (revised manuscript for intellectual content): B.Y.
Other (list other specific novel contributions): A.Ö., E.K.

Practical Applications

- This study investigated different therapies on the quality of life, pain levels, and range of motion in patients with chronic migraine headaches.
- The secondary aim of this study was to develop a migraine treatment protocol using current craniosacral techniques.
- CST and MFT techniques reduced migraine headache, TMD level, drug consumption, and functional disability levels, and increased cervical region ROM.

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