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The beneficial effects of therapeutic craniofacial massage on quality of life, mental health and menopausal symptoms and body image: A randomized controlled clinical trial

Gemma V. Espí-López[a,*], Lucas Monzani[b], Elena Gabaldón-García[a], Rosario Zurriaga[c]

[a] Department of Physiotherapy, Faculty of Physiotherapy, University of Valencia, Gascó Oliag Street, 5, 46010 Valencia, Spain
[b] Ivey Business School at Western University, Canada
[c] University Research Institute of Human Resources Psychology, Organizational Development and Quality of Work Life (IDOCAL), University of Valencia, Spain

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ABSTRACT

Objective: The objective of this study was to determine the effect of massage in the craniofacial area in menopausal women after the treatment and one month after its completion, and to measure its influence on quality of life in relation to symptoms of menopause, mental health, and body image perception.

Design: 50 participants with menopause, aged 45–65 years, participated in a single-blind randomized controlled trial. Participants were randomly assigned to two groups: craniofacial massage group (CMG), who received massage treatment (n = 25), and control group (CG), without treatment (n = 25). Prior to randomization, all participants provided demographic and clinical information. Quality of life, mental health and body image perception were evaluated at three time points: at the beginning of the study, at the end, and one month after finishing the treatment.

Results: A repeated-measures multivariate analysis of variance (RM-MANOVA) was used to determine if mean scores in the criteria differed significantly between time points within subjects. The results obtained indicate that the cranial massage techniques had a large, positive between-subjects effect on our three criteria (Wilks $\Lambda = .83$, $F_{(3,\ 44)} = 3.04$, p. < .05; Partial $\eta = .17$; $f = .45$) as well as a large, positive between-within subjects effect (Wilks $\Lambda = .64$, $F_{(6,\ 41)} = 3.91$, p. < .01; Partial $\eta = .36$; $f = .76$). In short, our treatment improved participants' mental health, partially ameliorated the decrease in scores on the Menopause Rating Scale and stopped the decrease in Body Image perception's scores.

Conclusions: The craniofacial massage protocol, applied to the craniofacial sphere, constitutes a complementary and valid therapy-based therapeutic option for clinicians in the treatment of different symptoms that occur in the climacteric period.

1. Introduction

Menopause is an important event in most women's lives because it marks the end of the natural reproductive life. The menopause is a time in which changes in physical, mental health and sexuality occur.[1–3] The most common symptoms of menopause are: sleep disturbances (76.3 %), fatigue (73.7 %), and lack of sexual interest (60.1 %). Moreover, fifty-four percent of women tend to have complex chronic medical conditions. In these cases, most women (70.2 %) are recommended hormone therapy to reduce the severity of their symptoms.[4]

On the other hand, women with menopausal symptoms also report significantly lower levels of quality of life, as well as increased disability at work and a greater need for medical attention, when compared to women who do not suffer from menopause symptoms. Likewise, the depression, anxiety, and joint stiffness that arise during menopause are significantly associated with symptom severity in health-related quality of life.[5] To sum up, the physical aspects of general health and wellbeing decrease during the menopause.[6]

Some studies also suggest that women suffering from menopausal symptoms experience psychological dissatisfaction with their bodies.[7,8] Menopause itself, whether it is received with sadness, anger or relief, practically necessitates a change in the way that women think about their bodies. Deeks and McCabe[7] found that menopausal women are less positive with respect to their appearance than premenopausal

* Corresponding author at: Department of Physical Therapy, University of Valencia, C/Gascó Oliag, 5, 46010 Valencia, Spain.
E-mail addresses: gemma.espi@uv.es (G.V. Espí-López), lmonzani@ivey.ca (L. Monzani), elenagabaldongarcia@gmail.com, Fisioterapia@aemc.org.es (E. Gabaldón-García), Rosario.Zurriaga@uv.es (R. Zurriaga).

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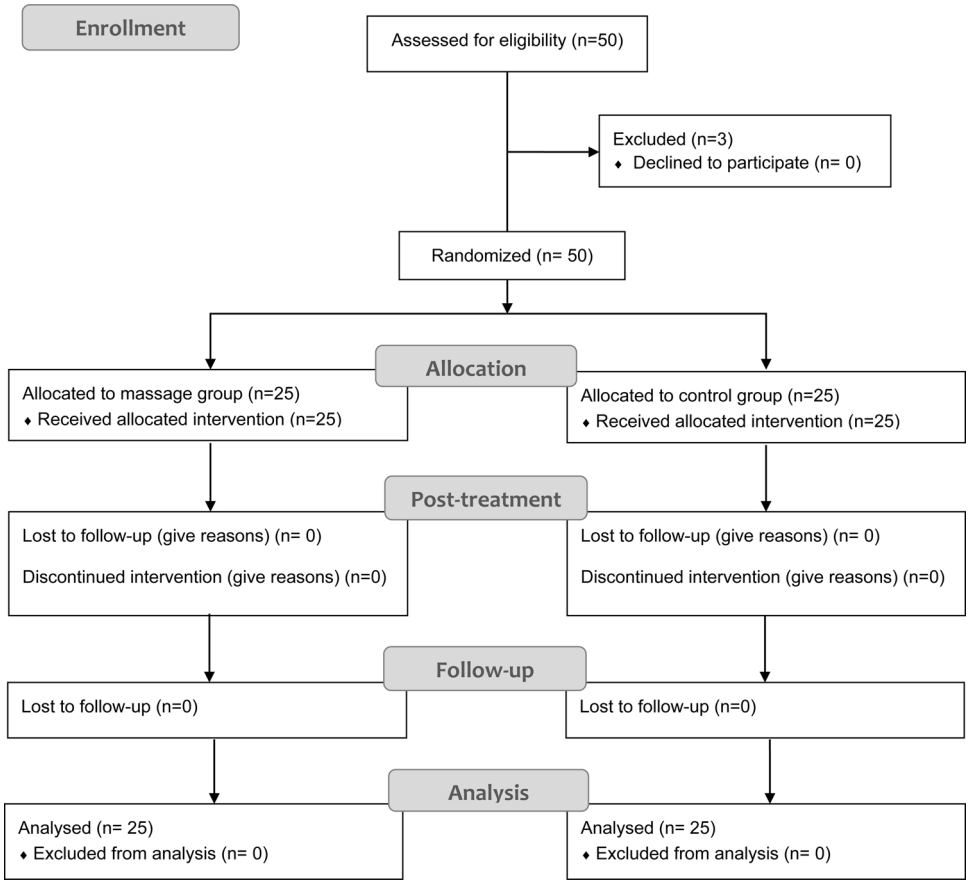

Fig. 1. CONSORT 2010 flow diagram.

women. Although the importance attributed to physical appearance and weight decreases as age increases,[8] body image perceptions remain as an important concern for menopausal women.

Patients default choice of treatment for menopausal symptoms is often pharmacological.[9,10] Nonetheless, there are non-pharmacological treatments that may improve quality of life and body image perceptions in menopausal women. For example, low-intensity exercises, such as yoga, have been shown to effectively reduce the menopausal symptoms, which consequently improves women's quality of life.[11] Similarly, segmented and global stretching exercises, strength exercises, massage therapy, relaxation techniques,[12] Chinese herbal medicine and acupuncture treatment effectively reduced the intensity of menopausal symptoms.[13] Similarly, mindfulness meditation also improves sleep quality, quality of life, and concentration, and can reduce vasomotor symptoms in postmenopausal women with insomnia.[14]

From all the aforementioned complementary therapies, patients declare massages, chiropractic, and nutrition to be the most effective approaches to relieve menopause symptoms.[15] In this sense, different studies have shown that massage applied to different parts of the body, yielded improvements in menopausal symptoms and quality of life.[16–19]

In the search for other treatments that might coexist with pharmacological treatments, we posit that manual therapy techniques should improve menopausal symptoms, perceived body image, and mental health. The massage is a manual technique that, through cyclic and rhythmic movements, seeks to achieve an effect of muscle relaxation, analgesia and sensory stimulation, reduce pain, increase alertness, reduce depression, and improve immune function.[20–23] Physiological effects of massages notably include activation of blood flow, improvement of visceral function and homeostasis through cutaneous-muscular stimulation and activation of sensory receptors.[18,24] There is evidence that cortisol decreases and serotonin and dopamine increase after massage therapy.[22] In short, massage therapy has beneficial effects on multiple conditions, such as pain syndromes, fibromyalgia, hypertension, and age-related problems.

The benefits of massage therapy may be due to the fact that massage stimulates pressure receptors, improving vagal activity and reducing cortisol levels, as well as the physical, physiological and biochemical effects. Other authors maintain that massage is beneficial because it facilitates relaxation, improving sleep quality and offering a feeling of peace and wellbeing, particularly in improving subjective sleep quality in postmenopausal women,[18] Some studies have applied therapeutic massage to improve climacteric symptoms in postmenopausal women, performing the intervention on the head, neck, back, abdomen, and the upper and lower limbs.[24] Other authors[22] highlight the need for more rigorous research with quality methodology on the effects of massage. However, to date there are no studies which apply massage to the cranial sphere in adults and evaluate its effects on different symptomologies, such as in menopause. Reviewing previous literature, we have found evidence on the benefits of cranial massage in patients with migraine.[25] However, there is no evidence on this type of massage and its beneficial effects on menopausal symptoms.

The aforementioned evidence compels us to formulate the following research question: if massage leads to relaxation and other proven benefits,[22] could then massage have positive effects in menopausal women? More precisely, we want to know if a localized massage to the cranial region lead such positive effects. This leads us to hypothesize that a therapy based in craniofacial massage would have a positive influence on: (a) women's quality of life, (b) their body image and their mental health. Identifying an effective non-pharmacological treatment to relieve menopause symptoms would provide a valuable contribution. Moreover, the practical implication of such study would be the development of a reproducible base protocol which can reduce menopausal

symptoms and to improve the quality of life, mental health, and body image during the climacteric process.

In consequence, the purpose of this study was to determine the effect of craniofacial massage after three weeks treatment, and one month after its completion, and to measure its influence on quality of life in relation to menopause symptoms, mental health, and perceived body image.

2. Methods

2.1. Participants

Given the exploratory nature of the present work, we used G*power 3.1 to calculate the necessary number of participants required to detect a large effect in an RM-MANOVA (f = .65). We took a value of $\alpha = .05$ and a $1\text{-}\beta = .80$, which is an accepted value for exploratory studies or when no prior information about effect sizes exist. Subsequently, our power analysis suggested that our study would require 27 participants per group. Our rationale is that if our study can detect large effects, the effect should appear as well in future studies in larger sample sizes.

Our sample consisted of 50 postmenopausal women referred from primary care physicians (Fig. 1). It included women from 45 to 60 years old, without a menstrual cycle for at least one year[26] and who presented at least two of the following menopausal symptoms: hot flushes, sweating, difficulty falling asleep, mood swings, urinary incontinence and/or vaginal dryness.

We excluded those women in whom craniofacial massage was contraindicated, or women who had poorly controlled clinical conditions (e.g., systemic arterial hypertension, use of hormone therapy, use of psychotropic drugs, a history of alcohol and/or substance abuse, diabetes or cancer who were receiving massage treatment).

2.2. Study design

We performed a randomized controlled trial (ClinicalTrials.gov Identifier: NCT03565952). Randomization was performed by a research assistant outside the study, who prepared a computer generated randomization sequence. From the randomization, opaque sequentially numbered envelopes were prepared. These contained the assigned treatment group for each participant. Once the participant completed the informed consent, the research assistant opened the envelope to reveal the patient's assignment just before starting the treatment. The patients were assigned to two groups: craniofacial massage group (CMG), who received massage treatment (n = 25), and control group (CG), without treatment (n = 25). The intervention period lasted three consecutive weeks (one session a week) with a follow-up at one month. Participants in the experimental group received three 30-min craniofacial massage sessions conducted each week. Quality of life, mental health and body image were evaluated at three time points: at the beginning of the study, at the end, and one month after completing the treatment. The protocol was performed in the laboratories of the institution where the first author works, which included a treatment room with a treatment table. The study was approved by the University of Valencia Ethics Committee (H1512322969694) and the procedure for this work was in accordance with the principles of the Declaration of Helsinki.

2.3. Intervention

The procedure was applied using an average degree of pressure and consisted of synchronized kneading and sliding movements. The trained therapist was situated cranially with respect to the participant. First, the cranial massage was performed in the prone position, and later the patient was placed in the supine position. Once the cranial massage was completed, the therapist moved on to the facial massage. To carry out the facial massage, a hydrating cream was used in order to facilitate the massage and not irritate the skin. The physiotherapist who applied the protocol had extensive experience with more than 5 years and to ensure correct application, prior training was carried out.

2.3.1. Cranial massage (prone decubitus)

The maneuvers performed were effleurage, friction from forehead to occipital in unison and alternately on both sides of the cranium, digital petrissage on the scalp, digital followed by palmar pressure along the sagittal line and lateral line over the parietals, mobilization of the scalp by applying a light traction to the hair to liberate the scalp, finishing once again with effleurage. This phase lasted 10 min.

2.3.2. Cranial massage (supine decubitus)

The maneuvers performed were effleurage, digital petrissage on the scalp, digital followed by palmar pressure along the sagittal line and lateral line over the parietals, mobilization of the scalp by applying a light traction to the hair to liberate the scalp, finishing once again with effleurage. A massage was also applied to the temporal muscles following the guidelines of El Hage et al.[27] Sliding movements of the surface over the anterior temporal muscle were performed in a circular clockwise movement. This phase lasted 10 min.

2.3.3. Facial massage (supine decubitus)

First, effleurage was performed, followed by friction from the center towards the sides, and digital kneading in the same direction, all of this from the forehead, cheekbones, and chin. On the masseter muscle, kneading movements were performed in the craniocaudal direction.[27] Finally, effleurage was applied to the entire facial sphere. This phase lasted 10 min.

2.4. Measures

Interviews were used to collect patients' anthropometric data and information about their menopause symptoms: hot flushes, sweating, changes in mood, or any type of genitourinary disorder such as vaginal dryness and/or urine leaks, symptoms related to menopause and their lifestyle habits. Personal information, employment status and educational level were included, in addition to information on smoking habits, physical exercise, and other types of diseases.

2.4.1. Quality of life and menopause-related mood

Quality of life and menopause-related mood was measured by the Spanish validated version of the Menopause Rating Scale (MRS).[28] This questionnaire assesses the severity of climacteric symptoms. It consists of 11 items relating to the symptoms of menopause divided into three scales: 1. MRS at the somatic level, which includes the following symptoms: hot flashes, sweating, heart discomfort, sleep disturbances, and joint and muscle discomfort. 2. MRS referring to the psychological aspect, which includes the following symptoms: depressed mood, irritability, anxiety, and physical and mental fatigue. 3. Urogenital MRS, referring to sexual problems, problems with urine and vaginal dryness.[29] Each participant scored each clinical manifestation from 0 to 4 according to whether she experienced the described symptoms from lesser to greater intensity, being "0" the lower intensity and "4" the greatest intensity. The total MRS score is the sum of the scores obtained in each block.[30] The questionnaire has high reliability and good validity, with a Cronbach's alpha of .86.[28]

2.4.2. Mental health

We used the Mental Health scale of the SF-36 quality of life questionnaire, adapted to Spanish population.[31] This scale consists of five items that assess general mental health, including depression, anxiety, behavior regulation, emotional regulation and positive affect. To answer these questions, the person must indicate how often they have experienced each of the evaluated items during the last four weeks. The answer choices range from 1 = always to 5 = never. Consequently,

higher scores in this scale (e.g., 5) represent higher level of mental health.

2.4.3. Personal body satisfaction and global self-perception

Measured with Body Satisfaction and Global Self Perception questionnaire (QSCPGS*e*) developed by Evers and Verbancka[32] and adapted to Spanish by Espí-López et al.[33] It is a self-administered questionnaire that captures body satisfaction and global self-perception. The Spanish version of the questionnaire has four factors labeled: Vitality (3 items, Cronbach' α = 68); Aesthetic Appraisal (3 items, Cronbach's α = .84); Cognitive Discomfort (2 items, Cronbach's α = .74) and Affective Discomfort (2 items, Cronbach's α = .70). Participants answer the questionnaire through semantic differentials. Higher scores represent a higher level of body satisfaction.

2.5. Controls

We controlled for participants' height and weight, given that body image perceptions are based on assessments of physiological characteristics. Similarly, given that body image perceptions tend to correlate with overall mental health,[34] participants' weight might affect their scores of overall mental health.

2.6. Statistical analyses

Group differences in demographic data were assessed using Student's *t* for continuous variables and Pearson's χ^2 difference test for nominal or ordinal variables. Statistical significance was set at $\alpha < .05$. The Kolmogorov-Smirnov test was used to evaluate data for normal distribution. A repeated-measures multivariate analysis of covariance (RM-MANCOVA) was used to determine if mean scores in the criteria differed significantly between time points within subjects. Violations of the assumption of sphericity were tested using *W* statistic.[35] Whenever this assumption was violated, Huynh-Feldt's[36] correction was then applied if $\varepsilon > .75$ in both the Greenhouse-Geisser[37] and Huynh-Feldt[36] tests. If the assumption of sphericity was confirmed and RM-MANCOVA showed significance, pairwise comparisons of estimated marginal means scores were performed using Bonferroni's method to adjust for multiple comparisons. All statistical analyses were performed with IBM SPSS 22 ©.

3. Results

The Kolmogorov-Smirnov test revealed that participants' age ($KS_{(50)}$ = .13**), height ($KS_{(50)}$ = .20***) and weight ($KS_{(50)}$ = .20***) were non-normally distributed. From our dependent variables, something similar occurred for the pre-test scores on the Body Image Scale ($KS_{(50)}$ = .13*) and the Mental Health sub-scale of the SF-36 ($KS_{(50)}$ = .15**). Only the follow-up scores for the Mental Health sub-scale of the SF-36 were non-normally distributed ($KS_{(50)}$ = .16**), as well as the MRS scale ($KS_{(50)}$ = .13*). All other variables were normally distributed. Table 1 presents the Means, *SD* and Mann-Whitney's *U* values for both groups for our criteria. In short, Table 1 shows that significant mean differences were found only for MRS scores. However, as shown in Table 2, there is a systematic co-variance in our dependent criteria, justifying the need to estimate marginal means after accounting for such correlation. Thus, Table 3 shows Wilks' Λ, *F*-values and estimated marginal means, *SE* and 95 % *CI* for the omnibus test of our RM-MANCOVA.

The multivariate omnibus solution of the RM-MANCOVA did not violate the homogeneity of variance assumption (Box's M = 59.58, $F_{(45,\ 7569.06)}$ = 1.06, p = .37), which means that the derived estimated marginal means can be considered trustworthy. However, Mauchly's *W* was significant for Quality of Life (MRS) (W = .29, χ^2 = 56.17, $p < .0001$), SF-36 Mental Health (W = .67, χ^2 = 17.87, $p < .0001$) and Body Image (W = .63, χ^2 = 20.56, $p < .0001$). Since ε was > .75, the Huynh-Feldt correction was used.[36]

The results of omnibus multivariate analysis revealed that neither participants' height (Wilks Λ = .93, $F_{(3,\ 44)}$ = 1.05, *ns*; Partial η = .07) nor weight (Wilks Λ = .90, $F_{(3,\ 44)}$ = 1.64, *ns*; Partial η = .10) had an effect on our three dependent criteria, even after controlling for their mutual correlation. Instead, our treatment had a large between-subjects effect (Wilks Λ = .83, $F_{(3,\ 44)}$ = 3.04, p. < .05; Partial η = .17; f = .45) as well as a large between-within subject effect (Wilks Λ = .64, $F_{(6,\ 41)}$ = 3.91, p. < .01; Partial η = .36; f = .76) on all three criteria (Menopause Rating Scale, SF-36 Mental Health, and Body Image). The achieved power for the between-subjects analysis was 1-β = .67 and for the between-within subjects' analysis was 1-β = .94

Regarding the observed between-within subjects' effect, estimated marginal mean values show that in the control group, participants' Body Image scores decreased from pre-test to post-test, and continued to decrease in the follow-up assessment. However, for the treatment group, while there was a decrease in the time from pre-test to post-test, the decrease stopped between post-test and follow-up.

A similar pattern emerged for the MRS, although the decrease in the slope between post-test and follow-up for the treatment group was not as important. Finally, the Mental Health scores in the control group decreased between pre-test and post-test, only to increase to the original levels in the time between post-test and follow-up. In contrast, the treatment group showed a systematic improvement from pre-test to post-test, and from post-test to follow-up (see Table 3 for the estimated marginal mean scores and Figs. 2–4 for an illustration).

Taken as a whole, these results suggest that the cranial massage techniques had a positive effect on participants' mental health and partially ameliorated the decrease in scores on the Menopause Rating Scale, and, in turn, stopped the decrease in Body Image perception.

4. Discussion

The objective of this study was to determine how massaging the craniofacial sphere influenced women's quality of life, in particular with regards to menopause symptoms, mental health, and body image perceptions. To pursue this objective, a manual massage therapy-based treatment was carried out, and its effects were evaluated immediately following the treatment (post-test) and one month after its completion (follow-up). Our results suggest that the cranial massage technique had a positive effect on all the evaluated areas, that is, participants' mental health, perceived intensity of menopause symptoms, and body image perceptions.

Our study's protocol capitalized on the insights of prior studies. For example, one study applied massage for 45 min during three consecutive phases lasting 4–6 weeks each to subjects with tension-type headache. Similarly to our study, this included massage and trigger point release on upper trapezius, suboccipital muscles, sternocleidomastoid.[38] In addition, such study also treated active myofascial trigger points, induced post-isometric relaxation in cervical flexion, circular friction on the masseter, temporalis, and occipital-frontalis muscles, and gentle effleurage and petrissage strokes to the neck and shoulders, which significantly improved headache severity and pain-pressure threshold.

Hage et al.[30] performed a massage protocol in which they included 15 sessions of 30-minute massage to the temporal muscles, masseters and hyoid musculature in subjects with temporomandibular joint disorders and evaluated other variables according to their objectives.[27] However, even though such study included treatment in the head region, once again the application of massage was done by combining a multitude of techniques in different body regions, so we cannot precisely know the real effects of massage applied to the cranial sphere. In our study, we applied the same massage guidelines for the temporal and masseter muscles, but we did not include the anterior cervical region in order to study the craniofacial area exclusively.

Finally, a third study[39] applied facial and cranial massage similar to

Table 1
Mean ± standard deviation of our control and dependent variables across groups across and data points (N = 50).

	Age	Height	Weight	Quality of Life	Mental Health	Body Image
Pre-test						
Control group	54.68 ± 2.82	1.64 ± 0.41	65.00 ± 3.00	16.20 ± 7.04	3.74 ± 0.57	4.16 ± 1.59
Treatment group	55.24 ± 4.04	1.63 ± 0.30	63.60 ± 2.55	18.36 ± 6.11	3.49 ± 0.64	4.40 ± 1.39
	U = 279.50	*U = 305.00*	*U = 230.50*	*U = 125.50*	*U = 237.50*	*U = 276.50*
	z = -.64, n. s.	*z* = -.15, n. s.	*z* = -1.65, n. s.	*z* = -3.24***	*z* = -1.46, n. s.	*z* = -.70, n. s.
Post-test						
Control group	–	–	–	11.92 ± 4.16	3.63 ± 0.53	3.88 ± 1.00
Treatment group	–	–	–	15.64 ± 4.46	3.65 ± 0.47	4.18 ± 1.13
				t(2,48) = *-3.04***	*t*(2,48) = *-.19 ns*	*t*(2,48) = *-.99 ns*
Follow-up						
Control group	–	–	–	10.52 ± 2.75	3.79 ± 0.49	3.72 ± 0.86
Treatment group	–	–	–	14.16 ± 3.80	3.88 ± 0.44	4.18 ± 0.91
				t(2,48) = *-3.89***	*U = 283.00*	*t*(2,48) = *-1.84*†
					z = -.58, n. s.	

Note: † $p < .10$; * $p < .05$; ** $p < .01$; *p*. values were calculated using Student's *t* for normally distributed variables and Mann–Whitney's *U* for non-normally distributed variables.

our study in women with sinus headache in Esfahan showing that there was a significant difference in the severity of pain after the intervention, reducing the severity of the pain of the sinus headache. Regarding menopausal symptoms, extant studies mostly investigate vasomotor symptoms, insomnia and pharmacological treatments due to the high direct and indirect costs of these disturbances as related to menopause,[40] but there are not many studies in which physical therapies have been used for the improvement of psychological symptoms of menopause by cranio-facial massage like mental health or body image perceptions. More precisely, we only found one study[41] that improves body image in menopausal women through massage, but the purpose of that study was to verify the effect of aromatherapy massage on abdominal fat and body image in postmenopausal women and again, but not include craniofacial massage, and do not study the effects of body image in the same sense as our study.

It has been shown that mental health (depression and anxiety) in menopause affects quality of life. [5] With the treatment applied in our study, there was an improvement in the mental health of the participants. In addition, the treatment had an impact on perception of body image, which is an important aspect of aging of women.[8] Finally, an improvement in the symptoms of menopause was also obtained; thus, the application of this massage protocol improved quality of life in the target population of this study.

Other authors reported the benefits of massage to reduce symptoms of anxiety and depression. For example, two studies[17,42] explored how applying an aromatherapy-based massage might reduce self-reported psychological symptoms. One study employed the Menopause Rating Scale, as our study did. The massage was applied to the abdomen, thighs, and arms, and although it did not include the cranial sphere, it reports a statistically significant effect against psychological symptoms of menopause. The second study applied aromatherapy massage and reported a decrease in depression levels.[42] In both studies, body massage was applied but neither study included cranial or facial massages. Both studies suggest that massage can be an effective complementary therapy to treat psychological symptoms. Thus, based on the above, we are confident that adding the application of our cranial and facial massage protocol to existing treatments, the positive effects on psychological symptoms of menopause would be greater.

The study by Lloyd et al.[43] showed information about the somatosensory pleasure circuit and highlighted the importance of massage encompassed as pleasurable touch, useful as a powerful means to modulate the peripheral sensations of the body, with benefits for chronic pain and stress reduction. Our study shows that massage has tangible effects on menopausal women, who suffer many symptoms that seriously affect their quality of life[44]; it would therefore be beneficial to include a non-pharmacological protocol for improving quality of life in menopause.

Although prior studies used cranial massages to treat afflictions such as migraine[45]; tension-type headache[46]; and temporomandibular joint disorders[27]; to the extent of our knowledge, none other study has applied cranial massage to treat the psychological symptoms of menopause. Therefore, our study is unique in that it provides a valid approach to increase women's quality of life during their menopause. Our study goes above and beyond prior studies, because we constructed a highly reproducible protocol and included a control group using a methodologically appropriate system. As prior studies, we also performed a single weekly session, but we applied a full head massage to achieve a greater effect to reach our objectives. Similarly, as indicated by Hachul et al.,[47] previous research on head massage has been methodologically lacking either because no control group was used or

Table 2
Pearson Bivariate correlations between for all variables in our study.

	1.	2.	3.	4.	5.	6.	.7	.8	.9	.10	.11
1. Menopause Response Scale – Pre-Test	–										
2. Menopause Response Scale – Post-Test	.83**	–									
3. Menopause Response Scale – Follow-up	.61**	.88**	–								
4. Mental Health – Pre-Test	−.71**	−.58**	−.44**	–							
5. Mental Health – Post-Test	−.63**	−.60**	−.42**	.81**	–						
6. Mental Health – Follow-up	−.51**	−.52*	−.31*	.52**	.74**	–					
7. Body Image – Pre-Test	.51**	.52**	.42**	−.60**	−.49**	−.23	–				
8. Body Image – Post-Test	.48**	.53**	.50**	−.63**	−.46**	−.16	.90**	–			
9. Body Image – Follow-up	.40**	.53**	.57**	−.47**	−.31**	−.16	.71**	.76**	–		
10. Experimental Group	.16	.40**	.49**	−.20	.14	.09	.08	.14	.26	–	
11. Participants' Height	.18	−.24	−.26	.13	.03	.11	−.19	−.17	−.22	−.10	–
12. Participants' Size	.13	.12	.12	.11	−.18	−.17	−.04	−.03	−.02	−.25	.10

Note: * p < .05; ** p < .01; Experimental Group: 0 = "Control Group" / 1 = "Treatment Group".

Table 3
Model 2. RM-ANOVA's estimated marginal means, standard errors (SE ±) and 95 % confidence intervals for the intervention groups across data points (N = 102).

Intervention group x data point (Between-Within Subjects effects)			
Measure	Group	Measurement	Est. Marg. Means, ± *SE*, [95% *CI*]
Quality of Life			
	Control	Pre-test	16.01, ± 1.32; [13.34, 18.67]
		Post-test	11.73, ± .84; [10.04, 13.43]
		Follow-up	10.35, ± .63; [9.08, 11.63]
	Treatment	Pre-test	18.55, ± 1.32; [15.89, 21.22]
		Post-test	15.82, ± .84; [14.13, 17.52]
		Follow-up	14.33, ± .64; [13.05, 15.60]
Mental Health			
	Control	Pre-test	19.51, ± .59; [18.32, 20.71]
		Post-test	18.85, ± .50; [17.84, 19.85]
		Follow-up	19.50, ± .49; [18.48, 20.44]
	Treatment	Pre-test	17.77 ± .59; [16.57, 18.96]
		Post-test	18.27, ± .50; [17.27, 19.28]
		Follow-up	19.49, ± .49; [18.52, 20.48]
Body Image			
	Control	Pre-test	4.19, ± .30; [3.58, 4.80]
		Post-test	3.90, ± .22; [3.45, 4.34]
		Follow-up	3.73, ± .18; [3.37, 4.09]
	Treatment	Pre-test	4.37, ± .30; [3.76, 4.98]
		Post-test	4.17, ± .22; [3.73, 4.61]
		Follow-up	4.18, ± .18; [3.82, 4.54]
Omnibus test:	Wilks $\Lambda = .64$, $F_{(6, 41)} = 3.91$**; Partial $\eta = .36$; $f = .76$		

Note: † p < .10; *, p < .05; ** p < .01. Estimated marginal means represent the mean scores after controlling for the systematic variation of our three criteria (Body Image, Mental Health and Menopausal symptoms). See results sections for a description of main effects (between- and within-subject effects).

the type of massage was not specified, making the treatments difficult to replicate.[18]

4.1. Limitations, strengths and future research

Our work is not without limitations. For example, our study has a relatively small sample size, although similar to other massage studies,[24] physical therapy techniques,[48] or other complementary techniques.[49] However, clinical trials often have relatively small sample sizes due to the difficult to find participants showing a specific array of symptoms. Future studies should attempt to replicate our work with a larger sample and evaluate other aspects that influence quality of life in menopausal women.

One of the strengths of this study is its methodological robustness. Its longitudinal experimental design allows us to avoid common biases in scientific research. A second strength is that it provides a reproducible protocol as a non-pharmacological therapeutic option in the treatment of menopausal women. We consider that this protocol may be appropriate, not only for headache, but also for insomnia and thus improve the quality of life of menopausal women. Future studies could study the effects of this protocol in both aspects and thus contribute to improving the quality of life of menopausal women.

Finally, we propose that, in applying the protocol of the present study, the addition of other corporal massage techniques even other types of cranial massage may yield better results to improve the quality of life of this population.[50] However, these results should be taken with caution, since the treatment improves some aspects and it remains to study the effect on other symptoms related to menopause.

5. Conclusion

The craniofacial massage protocol applied to the craniofacial sphere has positive effects on perceived quality of life in relation to the symptoms suffered by women in menopause and improvements in mental health and body image in this population were observed. In addition, constitutes a valid physical therapy-based therapeutic option for clinicians in the treatment of different symptoms that occur in the climacteric period.

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Conflict of interest

No competing financial interests exist.

CRediT authorship contribution statement

Gemma V. Espí-López: Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Data curation, Project administration, Writing - original draft, Writing - review & editing. **Lucas Monzani:** Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Formal analysis, Resources, Software, Writing - original draft, Writing - review & editing.

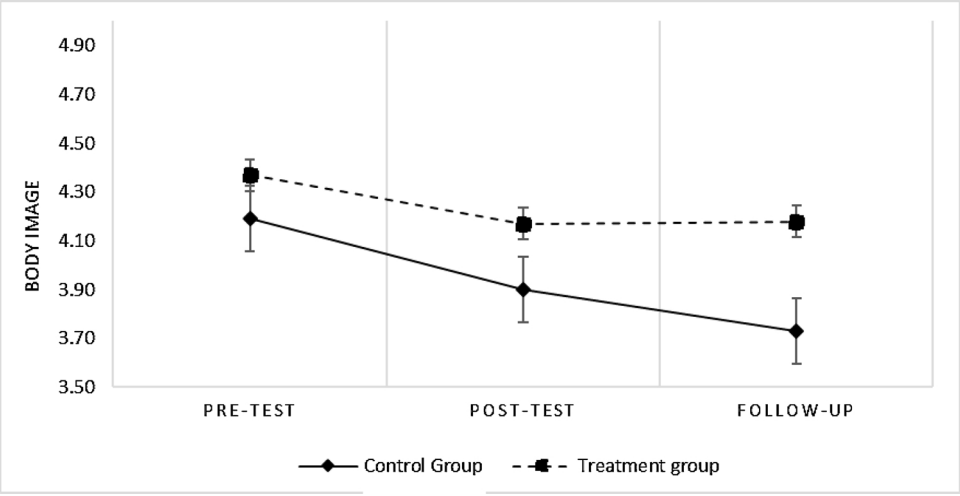

Fig. 2. Pre-test, Post-test, and Follow-up estimated marginal means for Body Image scores for treatment and control groups.

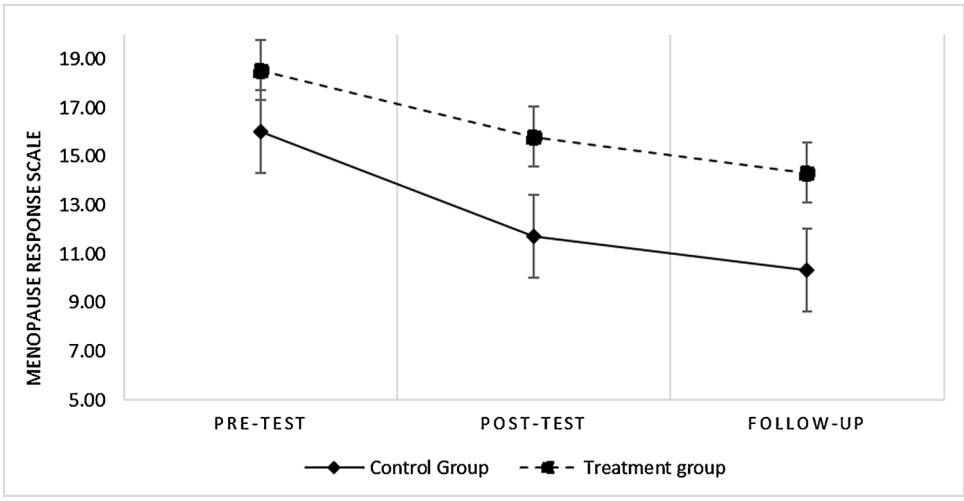

Fig. 3. Pre-test, Post-test, and Follow-up estimated marginal means for Quality of Life in Menopause scores for treatment and control groups.

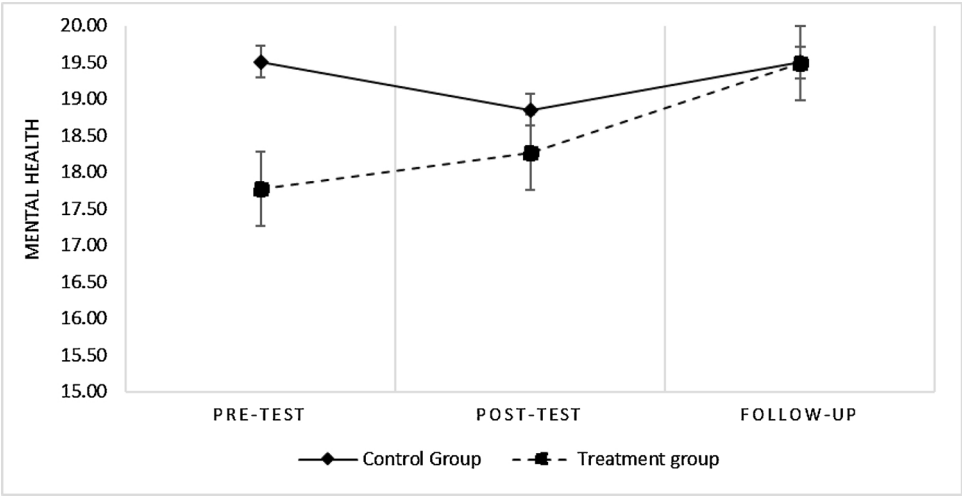

Fig. 4. Pre-test, Post-test, and Follow-up estimated marginal means of Mental Health scores for treatment and control groups.

Elena Gabaldón-García: Data curation, Project administration, Writing - original draft. **Rosario Zurriaga:** Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Writing - original draft, Writing - review & editing.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ctim.2020.102415.

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