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CLINICAL STUDY

Effects of feet reflexology versus segmental massage in reducing pain and its intensity, frequency and duration of the attacks in females with migraine: a pilot study

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Abstract

OBJECTIVE: To evaluate the effects of feet reflexology versus segmental massage in reducing pain and its intensity, frequency and duration of the attacks in females suffering from migraine.

METHODS: Forty eight females aged 33-58, suffering from migraine for 2 to 10 years were included in this study from November 2013 to November 2015. The study protocol was carried out in Department of Chronic Diseases at the Regional Hospital in Zywiec. In the reflexology group (RG) the patients received a series of 10 treatments 2 times per week; in the segmental massage group (SMG) the patients received a series of 15 treatments 3 times per week. Pain during migraine attacks was assessed using the visual analog scale (VAS), and headache features such as intensity (IA), frequency (FA) and duration (DA) of attacks were assessed before the treatment, just after the treatment, 3 months after the treatment.

RESULTS: All variables (VAS, IA, FA and DA) decreased within RG and SMG 3 months after the treatment in compare with the baseline values, and the differences were statistically significant. The differences between groups were also statistically significant.

CONCLUSION: Feet reflexology and segmental massage provide a safe alternative for the pharmacological treatment of migraine. The patients with migraine obtain significant health benefits with feet reflexology.

Keywords: Migraine disorders; Massage; Visual analog scale; Pilot projects

INTRODUCTION

Migraine headache is an intermittent disorder with an unpredictable course. Migraine is typically characterized as a neurovascular disorder of recurring, throbbing headaches, often associated with aura, nausea, vomiting, photophobia, phonophobia, fatigue and enhanced irritability. Both pericranial muscle tenderness (muscle allodynia) and cutaneous allodynia (scalp allodynia) have also been described during migraine attacks. Nociceptive inputs of myofascial origin have been postulated to play a role in migraine pathogenesis.[1-4] Migraine affects 11%-16% of the population. It is the 19th most prevalent disease, over 90% of migraineurs report some level of functional impairment that causes disability. Its peak prevalence occurs in those aged between 25 and 55 years and therefore affects a high percentage of adults in the productive phase of their lives.[5-10]

To this day, no cure exists for migraine. Although the pharmacotherapies provide some relief, they are associated with adverse events such as low blood pressure, nausea, depression, drowsiness, and rarely renal damage. For this reason the alternative to the pharmacotherapies are complementary therapies for migraine. Having researched the specialist journals, we found that there is lack of the research on the effects of feet reflexology and segmental massage in treatment of people suffering from migraine. Therefore, every new report from that field can extend our knowledge of how to effectively reduce the symptoms of migraine attacks.
In view of the above, the aim of this study was evaluation of the effects of feet reflexology versus segmental massage in headache relieving, relapse preventing and reducing migraine attacks in females.

MATERIALS AND METHODS

Subjects
Forty eight females aged 33-58, suffering from migraine for 2 to 10 years were included in this study lasting from November 2013 to November 2015. The study protocol was carried out in Regional Hospital in Zywiec at the Department of Chronic Diseases.

Inclusion criteria
The patients who met the following criteria were included: (a) age > 18 years; (b) diagnosis of idiopathic headache (migraine without aura - MO, migraine with aura - MA, tension-type headache - TTH) according to the original criteria of the International Headache Society classification;[11] (c) from 1 to 4 or more migraine attacks per month during the last 3 months and during the baseline period (4 weeks before enrollment); (d) the start of headache before the age of 50; (e) no prophylactic headache medicine, no acupuncture treatment or massage during the last 3 months; (f) no record of long-term analgesics consumption.

Exclusion criteria
The following patients were excluded: (a) headache caused by organic disorders, such as subarachnoid hemorrhage, cerebral hemorrhage, cerebral embolism, cerebral thrombosis, vascular malformation, arteritis, kidney stone or gallbladder, heart rate reduction, neoplasm etc.; (b) epilepsy; (c) psychosis; (d) pregnant at risk; (e) foot diseases; (f) alcohol or drug abuse.

Randomization and blinding methods
Eight patients met exclusion criteria. The remaining 40 patients were divided on 1 : 1 ratio using a simple random number table into two treatment groups: feet reflexology (n = 20) and segmental massage (n = 20). Randomization was done before the first treatment. The participants and researchers responsible for analyzing the data were blinded to the type of treatment procedure. After the experiment all participants were informed that they had received treatment with feet reflexology or segmental massage. Finally 40 participants completed the study and they were analyzed. The baseline characteristics of females are shown in Table 1. This study was designed in accordance with the rules for human experimental studies and approved by the Bioethical Committee of the Holycross College in Kielce and Regional Hospital in Zywiec. This study also conformed to the principles of the Declaration of Helsinki. All participants signed informed consent forms prior to participation.

Treatments
In the reflexology group (RG) the patients received a series of 10 treatments 2 times per week. The reflexology time did not exceed 30 min. First, the treatment was administered to the left foot and then the right foot (15 min each). During the treatments, the patients did not receive any other medications. Conducting reflexology, first of all, the relaxation technique was used from the footstalk toward the sole (plantar surfaces) at the beginning of the session. Then, four major plantar reflexology points (solar plexus, pituitary, heart and liver) were put under pressure using the thumbs. The other reflexology areas of the plantar surface of the foot were also massaged and finally intervention was put to an end with massaging the solar plexus.
In the segmental massage group (SMG) the patients received a series of 15 treatments 3 times per week. The treatment time did not exceed 20 min. During the treatments, the patients did not receive any other medications. First, evaluated reflex changes in vary between tissues. Conducting segmental massage, first 4-6 treatments carried out superficially, gradually increase the power of massage to the patient feel and to the "maximal points" (painful). Was performed in sequence: (a) spine massage; (b) back massage on both sides; (c) shoulder blade area massage on both sides; (d) muscles trapezius and nape of the neck massage; (e) muscles pectoralis major massage; (f) muscles sternocleidomastoideus massage; (g) occiput massage and finally (h) head massage.

Outcome measures
The study consisted of consecutive phases: before the treatment, just after the treatment, 3 months after the treatment. Pain during migraine attacks was assessed using the VAS, which is a 10-centemeters line which left and right sides correspond to no pain (0) and unbearable pain (10). The participants marked the scale to indicate their current level of pain. The value in centimeters was recorded for analysis.
The differences in pain during the period starting from the study before the treatment up to the last study 3 months after it were categorized on the five level in VAS: worsening in VAS, no change in visual analog scale (VAS), reducing 1-3 in VAS = slight improve-

Table 1 Baseline characteristics ($\bar{x} \pm s$)

Item		Reflexology group	Segmental massage group
Patients (*n*)		20	20
Age (years)		43.3±6.9	42.5±6.2
Occupation (*n*)	Physical worker/white-collar	6/14	9/11
	Worker	-	-
Duration of migraine (years)	-	7.5±2.3	7.0±2.3
Diagnosis (*n*)	MO	10	11
	MA	2	3
	TTH	8	6
VAS (*n*)	No pain	-	-
	Mild pain	-	-
	Moderate pain	2	3
	Severe pain	18	17
IA (*n*)	No attacks	-	-
	Mild	-	-
	Moderate	4	5
	Severe	16	15
FA (*n*)	No attacks	-	-
	1/month	2	2
	2-3/month	3	5
	≥ 4 month	15	13
DA (*n*)	No attacks	-	-
	< 1 h	6	5
	1-3 h	6	8
	> 3 h	8	7

Notes: MO: migraine without aura; MA: migraine with aura; TTH: tension-type headache; IA: intensity of attacks; FA: frequency of attacks; DA: duration of attacks.

ment, reducing 4-6 in VAS = moderate improvement, reducing 7-10 in VAS = marked improvement.

Headache features such as intensity (IA), frequency (FA) and duration (DA) of attacks were assessed. IA was coded on a clinical basis as: 0 if no attacks were reported; 1 if attacks were mild; 2 if they were moderate; or 3 if they were severe. FA was coded as: 0 if no attacks were reported; 1 if attacks were 1/month; 2 if they were 2-3/month; or 3 in the case of ≥ 4 attacks/month. DA was coded as: 0 if no attacks were reported; 1 if they lasted less than 1 h; 2 if they lasted 1-3 h; or 3 if they lasted more than 3 h. The differences in the clinical parameters describing headache IA, FA and DA in the period from the study before the treatment, just after the treatment and 3 months after it were categorized on the basis of a five level scale: worsening < 0; no change = 0; mild improvement = 1; moderate improvement = 2; marked improvement = 3.

Statistical analysis

SPSS 20.0 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY, USA) was used for the statistical analyses. Normality of distribution was examined by standard diagnostic tests (Shapiro-Wilk test, box plot, normal probability plot and histogram). Non-parametric repeated measures of Friedman test was used to compare differences in the measured parameters intra-groups (RG and the SMG) before the treatment. The nonparametric Mann-Whitney U test was used to inter-group comparisons of the mean variable differences before the treatment. Two-sided test was applied for all available data. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$). A *P*-value of less than 0.05 was considered significant.

RESULTS

Distribution of the studied variables

The results of Shapiro-Wilk test showed non-normal distribution of all the variables ($P < 0.05$, Table 2).

Comparison of pain (VAS), and headache features scores (IA, FA, DA) from the time before the treatment up to 3 months after the treatment

The values of all variables (VAS, IA, FA, DA) decreased within RG and SMG 3 months after the treatment in compare to the baseline values before the treatment, and differences were statistically significant ($P < 0.05$). The results indicate, feet reflexology and segmental massage markedly decrease pain and improve health status at females suffering from migraine (Table 3).

Comparison of pain (VAS), and headache features scores (IA, FA, DA) at each assessment time

Because overall repeated measures of Friedman test is significant, it should be carried out the comparing of the differences of the results inter-groups at each assessment time by Mann-Whitney U test. Comparison inter-groups showed that there were no differences in the baseline study before the treatment. In contrast, statistically significant differences were just after the treatment and 3 months after the treatment in favor of RG ($P < 0.05$, Table 4).

Comparison of overall scores of pain (VAS), and headache features (IA, FA, DA) 3 months after the treatment

Three months after the treatment the patients with RG achieved significantly better results than those with SMG across of all the domains. Differences inter-groups were statistically significant ($P < 0.05$). The results showed that feet reflexology more effectively reduced pain in VAS and IA, FA, DA and more efficiently than segmental massage improved the health of women suffering from migraine (Table 5).

DISCUSSION

A large part of clinical researches and systematic reviews have confirmed the successful effects of complementary therapies, especially acupuncture for migraine.

Table 2 Results of Shapiro-Wilk Normality Test of distribution of the studied variables

Variable	Reflexology group (n = 20)		Segmental massage group (n = 20)	
	W value	P value	W value	P value
VAS–before	0.860	0.008	0.869	0.011
VAS–after	0.763	0.000	0.824	0.002
VAS–3 months after	0.670	0.000	0.905	0.052
IA–before	0.780	0.000	0.780	0.000
IA–after	0.626	0.000	0.495	0.000
IA–3 months after	0.641	0.000	0.771	0.000
FA–before	0.813	0.001	0.817	0.002
FA–after	0.626	0.000	0.632	0.000
FA–3 months after	0.641	0.000	0.632	0.000
DA–before	0.808	0.001	0.903	0.048
DA–after	0.704	0.000	0.874	0.014
DA–3 months after	0.742	0.000	0.814	0.001

Notes: Shapiro-Wilk test $P < 0.05$. VAS: visual analog scale; IA: intensity of attacks; FA: frequency of attacks; DA: duration of attacks.

Table 3 Intra-group differences from the time before the treatment up to 3 months after the treatment

Variable	Reflexology group (n = 20)			Segmental massage group (n = 20)		
	mean (SD)	χ^2 value	P value	mean (SD)	χ^2 value	P value
VAS–before	7.8 (0.9)	-	-	7.4 (1.0)	-	-
VAS–after	1.0 (1.3)	-	-	2.1 (1.2)	-	-
VAS–3 months after	0.7 (0.9)	38.000	0.000[a]	3.2 (1.1)	35.795	0.000[a]
IA–before	2.7 (0.7)	-	-	2.8 (0.7)	-	-
IA–after	0.4 (0.5)	-	-	0.8 (0.4)	-	-
IA–3 months after	0.5 (0.5)	38.839	0.000[a]	1.2 (0.6)	37.176	0.000[a]
FA–before	2.0 (0.8)	-	-	2.2 (0.8)	-	-
FA–after	0.4 (0.5)	-	-	1.0 (0.5)	-	-
FA–3 months after	0.5 (0.5)	38.839	0.000[a]	1.0 (0.6)	24.500	0.000[a]
DA–before	8.3 (2.4)	-	-	7.9 (2.2)	-	-
DA–after	0.9 (1.2)	-	-	2.2 (1.2)	-	-
DA–3 months after	1.1 (1.2)	38.839	0.000[a]	2.9 (1.7)	37.176	0.000[a]

Notes: Friedman test, [a]$P < 0.05$. SD: standard deviation; VAS: visual analog scale; IA: intensity of attacks; FA: frequency of attacks; DA: duration of attacks.

Table 4 Inter-group differences at each assessment time

Item Variable	Before the treatment		After the treatment		3 months After the treatment	
	RG (n = 20)	SMG (n = 20)	RG (n = 20)	SMG (n = 20)	RG (n = 20)	SMG (n = 20)
VAS Sum ranks	458.000	362.000	309.000	511.000	230.000	590.000
U value	152.000		99.000		20.000	
Z value	1.340		− 2.816		− 4.973	
P value	0.201		0.006[a]		0.000[a]	
IA Sum ranks	389.000	431.000	330.000	490.000	300.000	520.000
U value	179.000		120.000		90.000	
Z value	− 0.606		− 2.533		− 3.303	
P value	0.583		0.030[a]		0.002[a]	
FA Sum ranks	378.000	442.000	302.000	518.000	320.000	500.000
U value	168.000		92.000		110.000	
Z value	− 0.912		− 3.378		− 2.896	
P value	0.398		0.003[a]		0.014[a]	
DA Sum ranks	432.000	388.000	306.000	514.000	300.000	520.000
U value	178.000		96.000		90.000	
Z value	0.593		− 2.965		− 3.160	
P value	0.565		0.004[a]		0.002[a]	

Notes: mann-Whitney U test, [a]$P < 0.05$. RG: reflexology group; SMG: segmental massage group; VAS: visual analog scale; IA: intensity of attacks; FA: frequency of attacks; DA: duration of attacks.

The existing results suggest that acupuncture is able to alleviate headache degree and/or improve the quality of life and it is as effective, if not more effective, as prophylactic drugs treatment.[10,12-18] However, there is lack of data of other complementary therapies such as feet reflexology and segmental massage.

Our studies confirmed the hypothesis that feet reflexology and segmental massage modulated relapse and reduced the symptoms of migraine attacks just after the treatment, and these effects persist 3 months after the treatment in comparison with the tests before the treatment.

We also confirmed the hypothesis, that there were statistical differences between feet reflexology and segmental massage in the efficiency of reducing the symptoms of migraine attacks in favor females with RG. Our results have shown, that females with RG achieved significantly better health benefits than patients with SMG in all of the features (VAS, IA, FA, DA).

The study has limitations. The major one is that the follow-up period was too short. We do not know about long-term health benefits of feet reflexology and segmental massage program for women suffering from migraine. The second limitation is the small sample size, which makes it impossible to assess the impact of feet reflexology and segmental massage on MO, MA and TTH.

Our findings are therefore to be read as preliminary ones in view of possible future long-term studies to confirm these results. Finally, further studies with larger sample size are still needed to assess the impact of feet reflexology and segmental massage for the various types of migraine separately for MO, MA and TTH.

In conclusion, feet reflexology and segmental massage provide a safe alternative for the pharmacological treatment of migraine, because we have not found any deterioration in health after 3 months the treatment compared to the baseline study in all females. Moreover, it significantly decreased greater extent the migraine attacks symptoms in patients with RG than in those with SMG. These findings may be valuable for physicians, physiotherapists, and patients with migraine regarding the selection of the most appropriate treatment on the basis of patients' preference and convenience.

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Table 5 Main headache characteristics three months after the treatment in both groups

Item		RG *n* (%)	SMG *n* (%)	*Z* value	*P* value
VAS	Worsening	-	-	-	-
	No change	-	2 (10)	-	-
	Mild improvement	2 (10)	3 (15)	-	-
	Moderate improvement	3 (15)	10 (50)	-	-
	Marked improvement	15 (75)	5 (25)	2.674	0.012[a]
IA	Worsening	-	-	-	-
	No change	-	3 (15)	-	-
	Mild improvement	3 (15)	8 (40)	-	-
	Moderate improvement	5 (25)	4 (20)	-	-
	Marked improvement	12 (60)	5 (25)	2.736	0.009[a]
FA	Worsening	-	-	-	-
	No change	-	2 (10)	-	-
	Mild improvement	6 (30)	8 (40)	-	-
	Moderate improvement	5 (25)	8 (40)	-	-
	Marked improvement	9 (45)	2(10)	2.178	0.037[a]
DA	Worsening	-	-	-	-
	No change	-	3 (15)	-	-
	Mild improvement	4 (20)	6 (30)	-	-
	Moderate improvement	4 (20)	8 (40)	-	-
	Marked improvement	12 (60)	3 (15)	2.773	0.007[a]

Notes: mann-whitney *U* test, [a]$P < 0.05$. RG: reflexology group; SMG: segmental massage group; VAS: visual analog scale; IA: intensity of attacks; FA: frequency of attacks; DA: duration of attacks.

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