

Effectiveness of self-applied acupressure for cervical pain of benign origin (EDIDO-CUH): a randomized controlled clinical trial

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Calvo Trujillo Susana¹, Toribio Martín Luisa Maria², Domenech Senra Pilar³, Mingo Moreno Teresa María⁴, Marín Solano Pilar⁵, Martín González Valentín⁶ and group EDIDO-CUH

Abstract

Background: Cervical pain is a problem with a high prevalence of ~13% of the population, and is more common in women (16.5%). The most affected age group is 65–74 years. Our aim was to assess the effectiveness of self-applied acupressure for decreasing benign-origin cervical pain, under the supervision of a health professional and in combination with usual treatment, as well as to examine its impact on the patient's self-perceived health condition and their opinion of the technique.

Methods: Pragmatic, multicenter, controlled clinical trial randomized by healthcare center. A total of 160 patients with benign-origin cervical pain between 18 and 65 years of age who attended primary care were included from 12 healthcare centers in the autonomous community of Madrid by consecutive sampling, and randomly assigned to a control or intervention group. The main outcome variable was pain intensity measured on a visual analogue scale (VAS) and secondary variables were self-perceived quality of life (EuroQol-5D utility index) and functional ability (neck disability index). An explanatory model of generalized estimating equations was built taking into account the lack of independence among observations. The analysis was performed over 6 months.

Results: In total, 150 patients completed the study. Mean age was 45 years (SD: 10.7), 86.7% were women, 86.2% were currently employed, and 57.9% did not perform any physical exercise. Average days experiencing pain was 32.9 (SD: 2.8) and 80% were undergoing previous pharmacological treatment. The quality of life utility index after 3 months was 1.6 points (95% CI: 0.54–2.71) higher in the intervention group. The pain score on the VAS was 0.16 points (95% CI: 0.80–0.48) lower in the intervention group. The health professional explained 10.4% of the reduction in pain observed on the VAS throughout the medical visits.

Conclusion: Acupressure applied in addition to usual practice appeared to improve cervical pain in the long term. The effectiveness of this technique was partially explained by the health professional that trained the participants on technique application.

Trial registration number: NCT01855893

Keywords

acupressure, musculoskeletal disorders, orthopaedics & trauma, pain management

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¹Primary Care Carabanchel Alto, Gerencia Asistencial de Atención Primaria, SERMAS, Madrid, Spain

²Primary Care Becerril de la Sierra, Gerencia Asistencial de Atención Primaria, SERMAS, Madrid, Spain

³Primary Care Santa Mónica, Gerencia Asistencial de Atención Primaria, SERMAS, Madrid, Spain

⁴Primary Care Maqueda, Gerencia Asistencial de Atención Primaria, SERMAS, Madrid, Spain

⁵Primary Care Martínez de la Riva, Gerencia Asistencial de Atención Primaria, SERMAS, Madrid, Spain

⁶San José Hospital, Madrid, Spain

Corresponding author:

Calvo Trujillo Susana, Centro de Salud Carabanchel Alto, n° 150, 28054 Madrid, Spain.

Email: scalvo@salud.madrid.org

Introduction

Cervical pain is a problem with a high prevalence, affecting ~13% of the population, especially women (16.5%). The most affected age group is 65–74 years.^{1,2} In the different Spanish autonomous communities, including Madrid where this study was performed, osteomuscular pathologies of the neck and shoulders rank fifth or sixth among the 10 most prevalent chronic issues by age and gender,³ and their prevalence further increases when considering relapses throughout life. The aim of this study was to assess the effectiveness of acupressure applied in combination with standard treatment for the relief of cervical pain of benign origin. In spite of its benign origin and favorable evolution, mechanical cervical pain has a substantial economic and social impact and severely affects the quality of life (QoL) of millions of people, who are often incapable of working or even accomplishing the simplest of tasks without proper treatment.⁴

Usual treatments delivered at healthcare centers for chronic or acute cervical pain normally consist of non-steroidal anti-inflammatory drugs (NSAIDs), but there is no evidence for their effectiveness. No differences have been observed between non-pharmacological treatments (training on pain handling, stress, performance of activities of daily life, pain relief, functional capability, or QoL) and placebo.⁵ Combining physical exercise with medication appears to influence treatment outcome.⁶ Studies estimating the effectiveness of acupressure for acute cervical pain have obtained better results than those using massage or placebo⁷ or transcutaneous electrical nerve stimulation (TENS) at 3 months, but this is not the case for chronic cervical pain in the long term.^{8,9} Kinesiology reduces recovery time by 7–23 weeks compared to usual pharmacological treatment and physical exercise,¹⁰ but with no noticeable differences at 1-year follow-up¹¹; compared with chiropractic, it further decreases pain at rest and increases mobility immediately after being applied.¹² There are still no conclusive data on the effectiveness of TENS.¹³

Finding an effective, satisfactory solution for the patient among usual treatments is difficult. The World Health Organization (WHO) has issued a call for public health systems to make the necessary cultural and regulatory changes to maintain the population's wellbeing by reconciling different therapies with usual practice, including manual techniques and exercises, with or without medication,⁴ especially when conventional treatments fail, taking into account their effectiveness and safety.^{14,15}

Scientific evidence on the effectiveness of acupressure is limited to a few clinical trials with limited casuistry^{16,17} or deficient methodology.^{14,17} This trial, based on a pilot study by our research team,^{14,16} attempted to provide answers to this question.

Methods

Patient and public involvement

Given the few existing clinical studies, usually with limited casuistry or poor methodology, scientific evidence for the

effectiveness of the acupressure technique is limited. This project aimed to assess a complementary treatment relative to the usual practice offered during our medical consultations for cervical pain. A former intervention by our research group included organization of a total of four workshops (during which 46 patients were trained in the technique without any adverse effects reported) that showed a reduction in pain of 1–2 points. For these reasons, an intervention consisting of a complementary treatment was designed and administered in a healthcare center. A series of workshops were held, during which different professionals (doctors, nurses, pediatricians, clinical assistants, midwives, and administrative staff) were taught to apply a technique with static postures similar to *Tui na* to reduce osteomuscular pain. Older patients were also asked to participate since they could also potentially benefit from this method beyond only receiving usual treatment.

Setting and participants

Patients were recruited during nursing or medicine consultations for cervical pain. Included subjects provided written signed consent for participation and were randomly assigned to an intervention or control group by a computer program. Patients were not informed about data analysis, although information regarding the study outcome was provided upon request. Those not assigned to the intervention group were later offered the opportunity to learn the technique during a medical or nursing consultation, or to attend the workshops that have been held periodically since 2016 in these healthcare centers.

This was a controlled, clinical trial of a non-pharmacological intervention randomized by healthcare center. A pragmatic design was chosen to assess the effectiveness of the intervention, while taking into consideration the different ways to implement the technique under real practice conditions. The sample included patients between 18 and 65 years of age who attended primary care consultations at one of the 12 healthcare centers included in the study between 25 July 2013 and 31 August 2017 and provided written consent to participate. They were recruited by consecutive sampling after they reported suffering from cervical pain with muscle contracture and functional and postural limitations, but without structural damage or irradiation. Criteria for exclusion were: injury to the massage area (i.e. skin or osteomuscular damage, presence of and/or tendency to hemorrhage); chronic, severe, or decompensated disease; malignant illness or significant physical deterioration; mental disorders; sensory alterations; receipt of physiotherapy in the past month or intention to do so; use of analgesic medications described in the second and third rungs of the WHO analgesic pain ladder (e.g. codeine with or without acetaminophen, dihydrocodeine, dextketoprofen, tramadol, morphine, or fentanyl, alone or in combination with acetaminophen, metamizol, aspirin, or other NSAIDs); and difficulty reading or visual impairment hindering completion of the questionnaires.

Study physicians and nurses voluntarily engaged with the trial: five of them were already trained in acupuncture and all received training and materials on the intervention technique on at least one occasion at their work centers, which is similar to a pilot experience by our research group.¹⁸ In order to detect a decrease in pain of 1.5 points on the visual analogue scale (VAS) with a type I error rate of 0.05 and a power of 95%, and considering anticipated losses to follow-up of 20%, the sample size required was calculated to be 160 patients (80 in each group).

Patients who signed informed consent were allocated to the intervention or control group by simple random sampling automatically performed by the data collection notebook software. This software, which is based on PHP, jQuery and MySQL web technologies, was developed for this trial and allowed access from any browser independently of the device or operative system. A relational database was employed based on data from studies, consultations, and patients. After checking for inclusion and exclusion criteria, the patient was automatically included and randomly assigned to one study group. The system allowed for the data to be exported in .csv format for subsequent analysis.

Both groups were treated following usual practice, which, in the case of the intervention group, was supplemented by acupressure. This technique, based on the *Tui na* massage method, consisted of finding a hardened painful point on which a circular massage of 3–5 mm was applied with the fingers for a period of 5 s to 2–3 min, until the area reddened. The intention was for the patient to benefit from its relaxing effect and a decrease in resistance at the site of stimulation, as well as the production of neurotransmitters and substances including noradrenaline or adenosine, without suffering the pounding that is usually performed as part of the *Tui na* method.¹⁹ The painful point was then pressed and released bilaterally, starting at the most distal points. At certain points, such as the shoulders, the contralateral hand could be used. This maneuver was repeated 60 times per minute, with a pause every five. Supplemental Figure 1 describes the detailed, complex intervention in accordance with the proposal of Pereda et al.²⁰ Acupressure was applied at the locations of the following traditional acupuncture points, stimulation at which is believed to have a beneficial effect on cervical pain: GV20 (*Baihui*), GB19 (*Naokong*), GB20 (*Fenchi*), GB21 (*Jianjing*), GB34 (*Yanglingquan*), LI4 (*Hegu*), SI3 (*Houxi*), SI6 (*Yanglao*), SI9 (*Jianzhen*), SI10 (*Naoshu*), SI11 (*Tianzong*), SI12 (*Bingfeng*), SI13 (*Quyuan*), SI14 (*Jianwaishu*), SI15 (*Jianzhongshu*), and BL60 (*Kunlun*).

Outcome variables

The main outcome variable was pain intensity as measured on a 10-point, 10-cm-long VAS, where 0 stands for absence of pain and 10 for the worst conceivable pain. Secondary variables were: number and type of analgesics used,

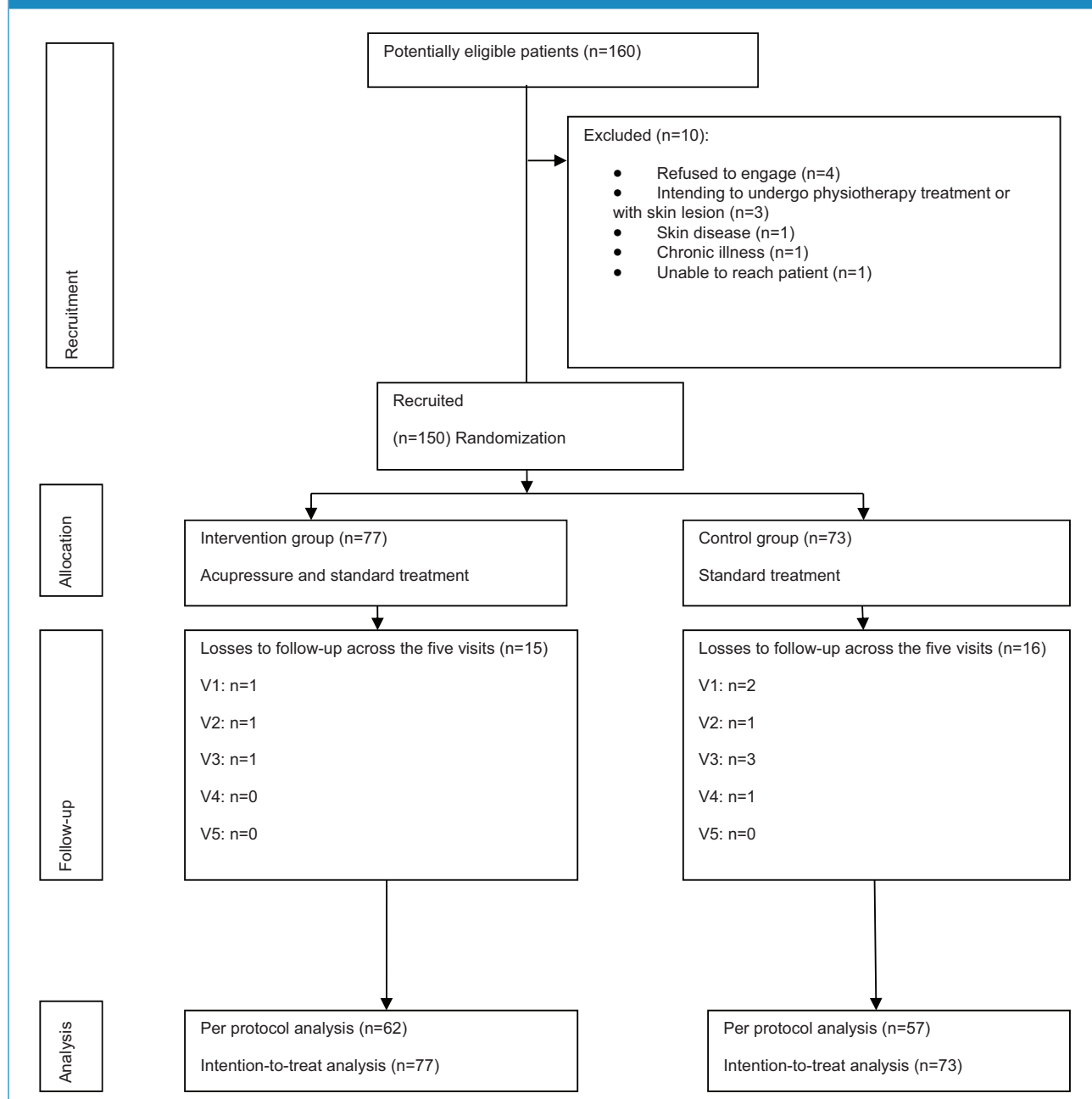
according to the WHO classification; the defined daily dose (DDD) in mg/day; adverse effects; QoL measured using EuroQoL-5D²¹; neck disability index (NDI)²²; and days of temporary working disability.²³ The following variables were recorded: socio-demographic (age, gender, educational level, work activity); clinical (previous cervical pain episodes during the past year, diagnostic tests, evaluation by specialized care); and previous treatment (pharmacological, physical). Upon completion of the study, participants in both groups were questioned about the professional that delivered the intervention, with respect to information provided and clarity of the explanation. Patients in the intervention group also answered questions regarding the technique and side effects.

Data analysis

Patients' characteristics were analyzed in a multivariate model where the main independent variable was the intervention group and the dependent variable was the post-intervention change in pain, measured on the VAS. Continuous variables were defined by their measures of central tendency, dispersion, and mean with 95% confidence intervals (95% CIs). Discrete variables were described by the estimation of proportions with 95% CI. Independent measurements on the pain VAS at 1, 3, and 7 days (baseline visit V1 and follow-up visits V2 and V3, respectively) were compared between the two groups. In order to check if the effectiveness of the intervention persisted over time, measurements were repeated after 30 and 90 days (follow-up visits V4 and V5, respectively). Mean values were compared using a Student's t-test or Mann-Whitney U-test. A generalized estimating equation (GEE) model was built to compare the evolution of pain measurements over time between groups, taking into account repeated measurements over time and the lack of independence between observations. The dependent variable was the change in pain between V1 and V5 measured on the VAS, and independent variables were the allocation group and subjects' characteristics, including their baseline self-perception of QoL. A multilevel mixed model was built to explain the variability resulting from the professional (cluster) responsible for the patient's training in the technique.

Both per protocol and intention-to-treat analyses were performed. For the cases where data from the pain VAS or QoL was missing, the last value provided by the patient (namely "last observation carried forward")²⁴ was used for the analysis. For the assessment of secondary outcome data, scores from the QoL questionnaires (days: 7, 30, and 90), mean number of days free of symptoms, and mean DDD of NSAIDs were compared between the intervention and control groups. This trial was approved by the Ethics Committee of Hospital Fundación Alcorcón de Madrid and the Central Board for Research in Primary Care on 28 February 2013, and was prospectively registered at ClinicalTrials.gov

Figure 1. Flowchart of patients and losses to follow-up between baseline visit (V1) and subsequent visits at 3 days (V2), 7 days (V3), 30 days (V4), and 90 days (V5).



(NCT01855893) on 17 May 2013, prior to recruitment of the first participant on 25 July 2013.

Results

Of the 160 patients invited to participate, 150 agreed and 144 completed the five scheduled visits. No differences were observed between groups in terms of rates of study completion. Mean age was 45 years (SD: 1.06) and 86.7% were women. Table 1 describes the population characteristics,

which were similar between groups at baseline. Figure 1 shows the flow of participants throughout the study.

The mean baseline value of pain was 6.5 points (SD: 0.13) on the VAS. No differences were observed between groups after 3, 7, and 30 days. However, a significant difference on the pain VAS was found after 90 days; VAS scores were 1.6 points higher (95% CI: 0.54–2.71) in the control group (Table 2). Immediately after patients in the intervention group received training in the acupressure technique, the majority (41%) reported lower levels of pain by 1–2 points

Table 1. Comparative analysis of socio-demographic variables and baseline data.

	Total n	Control n	Intervention n	p value
Sex, n (%)	150	73	77	0.543
Female	130 (86.7)	62 (84.9)	68 (88.3)	
Male	20 (13.3)	11 (15.0)	9 (11.7)	
Age, mean (SD)	150	73	77	0.316
	45 (10.6)	45.9 (10.6)	44.1 (10.5)	
Educational level, n (%)	145	69	76	0.446
Primary education	46 (31.7)	19 (27.5)	27 (35.5)	
Secondary education, vocational training, and others	72 (49.7)	38 (55.0)	34 (44.8)	
College and university education	27 (18.6)	12 (17.4)	15 (19.8)	
Employment situation, n (%)	145	69	76	0.803
Unemployed/retired	20 (13.8)	9 (13.0)	11 (14.4)	
Active worker	125 (86.2)	60 (86.9)	65 (85.5)	
Physical exercise more than once a week, n (%)	145	69	76	0.500
No	84 (57.9)	39 (55.0)	40 (60.5)	
Yes	61 (42.0)	31 (44.9)	30 (39.5)	
Previous record of related neck pathology	145	69	76	
Scoliosis (no)	132 (91.0)	63 (91.3)	69 (91.0)	0.914
Head and/or neck trauma (no)	130 (89.7)	60 (87.0)	70 (92.1)	0.309
Chronic pathology	145	69	76	0.777
No	90 (62.0)	42 (62.9)	48 (63.1)	
Yes	55 (37.4)	27 (39.1)	28 (36.8)	
Days suffering pain (SD)	145	69	76	0.436
	32.9 (34.5)	35.2 (35.8)	30.8 (33.3)	
Days of work leave with pain (SD)	145	69	76	0.669
	2.8 (8.0)	2.5 (8.3)	3.0 (7.8)	
Functional capability with pain	150	73	77	0.104
≤30%	18 (12.0)	10 (13.7)	8 (10.4)	
40%–50%	38 (25.3)	12 (16.4)	26 (33.8)	
60%–70%	36 (24.0)	20 (27.4)	16 (20.8)	
80%–90%	45 (30.0)	22 (30.1)	23 (29.9)	
100%	13 (8.7)	9 (12.3)	4 (5.2)	
Previous diagnostic tests	144	69	75	0.617
	41 (28.5)	21 (30.4)	20 (26.7)	
Previous evaluation by specialized care (yes)	150			0.715
	27 (18.0)	14 (19.2)	13 (16.9)	
Previous pharmacological treatment	145	69	76	0.934
Yes	116 (80.0)	55 (79.9)	61 (80.3)	
No	29 (20.0)	14 (20.3)	15 (19.7)	

(Continued)

Table 1. (Continued)

	Total n	Control n	Intervention n	p value
Type of previous pharmacological treatment	145	69	76	
NSAIDs	92 (63.4)	43 (62.3)	49 (64.5)	0.788
Non-NSAID analgesics	43 (29.7)	23 (33.3)	20 (26.3)	0.355
Muscle relaxant	6 (4.1)	2 (2.9)	4 (45.3)	0.475
Diazepam	38 (26.2)	19 (27.4)	19 (27.4)	0.729
Location of pain	144	69	75	0.023
Neck	23 (16.0)	16 (23.2)	7 (9.3)	
Neck and shoulders	121 (84.0)	53 (76.9)	68 (90.7)	
Type of cervical pain	144	69	75	0.221
Acute <6 weeks	52 (36.1)	23 (33.3)	29 (38.7)	
Sub-acute >6 weeks	27 (18.7)	17 (24.6)	10 (13.1)	
Chronic >6 months	65 (45.1)	29 (42.0)	36 (48.0)	
VAS, cm (SD)	144	69	75	0.963
	6.5 (1.7)	6.5 (1.6)	6.5 (1.7)	

SD: standard deviation; NSAIDs: non-steroidal anti-inflammatory drugs; VAS: visual analogue scale.

on the VAS, 26% stated that they did not feel any change, and 8% experienced an increase in pain of 1–2 points.

In terms of QoL, utility values from the EuroQol-5D measured at 30 and 90 days did not significantly differ for intervention versus control groups (0.05 points; 95% CI: 0.00–0.09). The average number of patients that were prescribed medication after the first medical consultation differed between groups, being higher ($p \leq 0.01$) for the control group (94%; 95% CI: 88.7–99.7) versus the intervention group (76; 95% CI: 66.3–85.7). Comparing the control and intervention groups, medication rates were: 73% ($n=50$) versus 58% ($n=43$) for NSAIDs ($p=0.058$); 45% ($n=31$) versus 27% ($n=20$) for non-NSAIDs like acetaminophen and metamizole ($p=0.022$); 19% ($n=13$) versus 21% ($n=16$) for relaxant-type drugs like cyclobenzaprine ($p=0.709$); and 42% ($n=29$) versus 23% ($n=17$) for diazepam ($p=0.013$). In terms of the type of prescribed pain relievers, there were no significant differences in the demand by patients between the groups across the five follow-up visits. In terms of inability to work, the impact of acupressure on the NDI was measured but no differences were found between groups (Table 2). Among subjects in the intervention group, 10% of the change observed on the pain scale along the follow-up visits was due to the recruiting professional in terms of the observed results of the technique on the first visit, prior acupuncture training, and their ability to transmit information, but not their personal characteristics.

In the adjusted model (Table 3), the mean value of pain reported on the VAS by subjects in the intervention group was 0.16 points (95% CI: –0.80 to 0.48) lower than that in the

control group ($p>0.05$). In the acupressure group, the mean score on the pain VAS decreased 0.17 points (95% CI: –0.80 to 0.46) per intervention day, which did not significantly differ from that achieved by the control group. Individuals with a moderate, severe or complete degree of disability obtained a mean QoL utility index that was 0.09 (95% CI: –0.17 to 0.02), 0.16 (95% CI: –0.24 to –0.09), and 0.26 (95% CI: –0.35 to –0.17) points lower, respectively, than that of individuals who reported a low NDI at the baseline visit. After 90 days, the treatments' effects on functional capability with pain and initial neck disability did not significantly differ between groups.

The final questionnaire about the health professional that informed patients about the intervention and their clarity of presentation was answered by 104 patients (69%), 37% of the intervention group, and 32% of the control group. Of these, 97% received the trial information from their general practitioner and 74% considered the presentation to be very clear. Fifty-six participants (70%) answered the relevant questions. Of them, 41 (73%) received the information from their family doctor, 40 (71%) thought it was very clear, and 32 (57%) considered the information from the support leaflet to be very clear. Finally, 43 (77%) considered the technique to be simple or very simple, 33 (59%) thought it was very useful, and 34 (61%) would recommend it.

Adverse effects

The intervention group was also asked about different aspects of the technique, including side effects, which were

Table 2. Intervention effectiveness at 1, 3, 7, 30, and 90 days.

	Visit 1: basal (n = 147)		Visit 2: day 3 (n = 138)		Visit 3: day 7 (n = 135)		Visit 4: day 30 (n = 125)		Visit 5: day 90 (n = 94)		
	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	
Pain VAS	Intervention	6.5 (6.10 to 6.90)	0.980	4.5 (3.98 to 5.05)	0.205	3.9 (3.36 to 4.58)	0.917	3.3 (2.68 to 4.07)	0.396	2.2 (1.52 to 2.98)	<0.01
	Control	6.5 (6.12 to 6.90)		5.0 (4.47 to 5.53)		4.0 (3.44 to 4.60)		3.8 (3.06 to 4.55)		3.8 (3.05 to 4.71)	
Utilities EuroQoL-5D	Intervention	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P
	Control	0.6 (0.41 to 0.74)	0.592	0.7 (0.63 to 0.79)	0.592	0.7 (0.63 to 0.79)	0.156	0.8 (0.71 to 1.00)	<0.01	0.8 (0.74 to 1.00)	<0.01
Prescribed analgesia	Intervention	0.6 (0.38 to 0.74)		0.7 (0.63 to 0.79)		0.7 (0.68 to 0.79)		0.7 (0.63 to 0.79)		0.7 (0.65 to 0.79)	
	Control	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P
Intervention	76.0 (66.3 to 85.7)	<0.01	62.5 (51.3 to 73.7)	0.037	57.5 (46.2 to 68.9)	0.177	37.3 (25.7 to 48.9)	0.023	27.3 (15.5 to 39.0)	0.055	
Control	94.2 (88.7 to 99.7)		78.8 (68.9-88.7)		68.9 (57.2 to 80.5)		57.6 (45.0 to 70.2)		45.7 (31.3 to 60.0)		
TD	Intervention	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P	\bar{x} (CI 95%)	P
	Control	14.3 (6.5 to 22.1)	0.135	13.0 (5.5 to 20.5)	0.0473	9.1 (2.7 to 15.5)	0.393	4.11 (-0.4 to 8.7)	0.999	1.3 (-1.2 to 3.8)	0.970
Intervention	6.9 (1.1 to 12.6)		4.1 (-0.1 to 8.7)		5.5 (0.0 to 10.7)		0.0 (0.0 to 0.0)		1.4 (-1.3 to 4.0)		
NDI	Intervention	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P	\bar{x} (IQM)	P
	Control	26.0 (21.0 to 32.0)	0.024	20.0 (16.0 to 25.0)	0.780	19.0 (15.0 to 23.0)	0.343	16.0 (12.0 to 22.0)	0.381	14.5 (10.5 to 20.5)	0.217
Intervention	23.0 (18.0 to 27.0)		20.0 (15.5 to 24.0)		16.0 (14.0 to 22.0)		17 (13.0 to 23.0)		17.5 (12.0 to 21.0)		

TD: temporary disability; NDI: neck disability index; VAS: visual analogue scale; IQM: interquartile mean.

Table 3. Explanative generalizing estimating equation model of the effectiveness of acupressure for quality of life utilities, functional capability, and pain scores.

	Utilities (EuroQol-5D)			Pain VAS		
	Coefficient	p > z	95% CI	Coefficient	p > z	95% CI
Intervention	0.049	0.031	0.004 to 0.0944	-0.157	0.69	-0.797 to 0.48
Visit 1 (baseline)	0.0007	0.036	0.00004 to 0.001	-0.013	0.005	-0.022 to -0.003
Difference between visits V1–V5	0.001	0.037	0.00005 to 0.0019	-0.016	0.008	-0.02 to -0.004
Functional capability at visit 1 (baseline)						
40%–50%	-0.052	0.151	-0.123 to 0.019	0.604	0.254	-0.434 to 1.644
60%–70%	-0.025	0.485	-0.097 to 0.046	0.444	0.404	-0.598 to 1.48
80%–90%	-0.039	0.266	-0.1090 to 0.030	0.398	0.438	-0.607 to 1.404
100%	-0.034	0.439	-0.121 to 0.052	1.371	0.033	0.11 to 2.63
NDI at visit 1 (baseline)						
Moderate disability	-0.08	0.062	-0.164 to 0.003	0.452	0.466	-0.164 to 0.003
Severe disability	-0.16	0	-0.24 to -0.075	1.391	0.026	-0.24 to -0.075
Complete disability	-0.279	0	-0.38 to -0.173	1.326	0.088	-0.38 to -0.173
Chronic disability	0.806	0	0.699 to 0.91	3.861	0	2.328 to 5.395
	n = 614 Wald $\chi^2(10) = 90.02$ Prob > $\chi^2 = 0.000$			n = 614 Wald $\chi^2(10) = 82.25$ Prob > $\chi^2 = 0.000$		

V: visit; NDI: neck disability index; VAS: visual analogue scale; CI: confidence interval.

then checked by the research team. Four types of adverse effects were observed (pain, dizziness, hypotension, and hematoma at the site of pressure application), which usually appeared in combination in the same subject. Only one participant dropped out of the study (Table 4).

Discussion

Cervical pain is a pathology mainly present in adults^{25,26} and women.^{25,27} Socio-demographic characteristics, personal background, and baseline anamnesis of patients in this study were similar to those already published by different authors.^{25–28} The high level of engagement by participants, with only 5% loss to follow-up, must be highlighted.

This study was conducted under pragmatic conditions and involved a high number of professionals training patients in the applied technique. This resulted in high variability, with the professional accounting for 10% of the intervention's effectiveness. Patients whose trainers had undergone at least two or three intervention workshops obtained better results, which should be taken into consideration for future implementation and application.

A similar reduction in pain without significant differences was observed in both groups in the short term. Even though no differences were observed between groups at follow-up visit V2, around 55% of patients in the intervention group

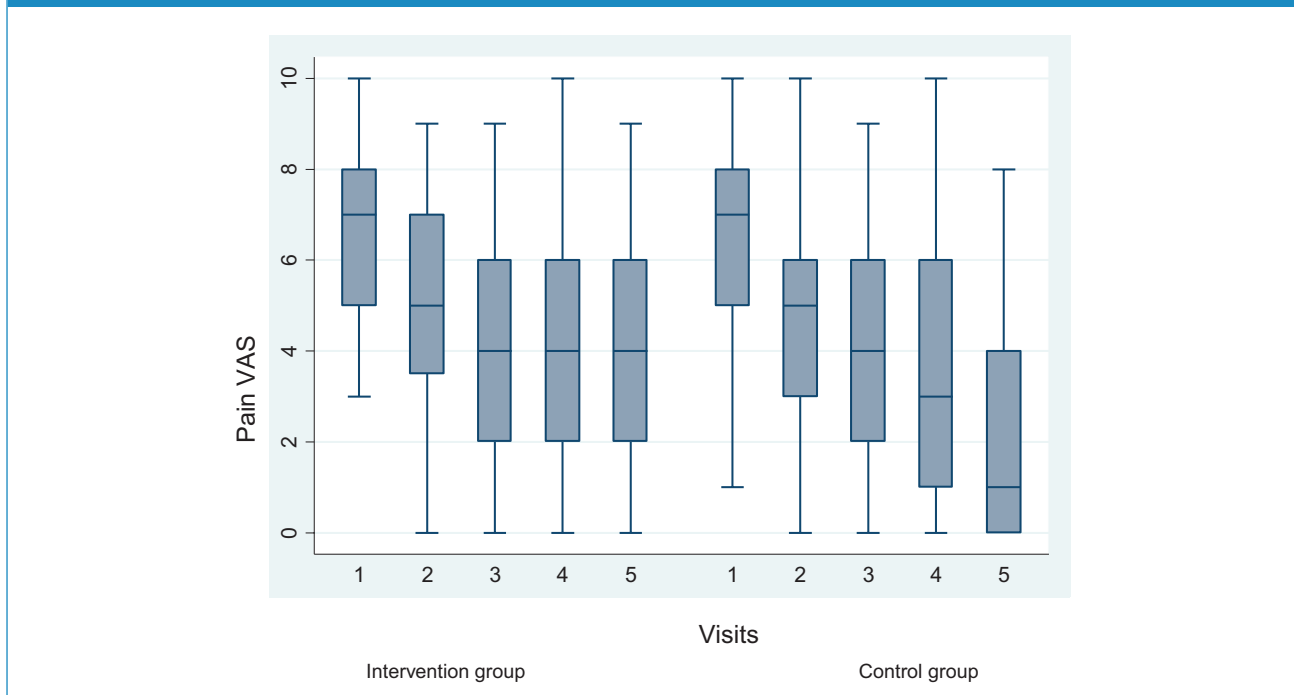
experienced a pain decrease of 1–3 points on the VAS immediately after receiving the training (V1) (Figure 2), which can be explained by the fact that the intervention arm received less pharmacological treatment, although their treatment included both acupressure and medication. This may stem from overestimation of the potential effect of the intervention technique by some professionals after receiving the training and observing the first results, and in some cases due to the previous personal experience of acupuncture among the training professionals.

At 90-days post-intervention, there was a difference of 1.63 points on the pain VAS in favor of the intervention group. This outcome is in agreement with other studies comparing different types of low-risk massage that did not find statistically significant differences among their effects. A literature review by Chou et al. (n = 190) noted that acupuncture was more effective than Swedish massage at decreasing pain (mean difference (MD) of 0.8 points on a 10-point VAS) and improving functional capability (MD of 7 points in the 0–100 scale Hanover functional ability questionnaire) in the short term.²⁹ Another trial (n = 268) that compared massage techniques did not find differences between structural and relaxation massages (MD of 0.4 points) but observed different mean values of pain in terms of discomfort after application (~0.3 points on a 0–10 point scale).²⁹ Other studies with smaller

Table 4. Adverse effects in 74 patients and number of related dropouts at each visit.

	Visit 2	Visit 3	Visit 4	Visit 5	Total
Dizziness	8/0	10/0	5/0	4/0	27/0
Hypotension	1/0	2/0	1/0	0/0	4/0
Hematoma	1/0	0/0	0/0	0/0	1/0
Pain	16/0	14/0	10/0	4/0	44/0
Does not know	1/0	1/0	0/0	2/1	4/1
Total	27/0	27/0	16/0	10/1	80/1

Figure 2. Evolution of pain in both groups measured on a visual analogue scale (VAS) at baseline visit (V1) and follow-up visits at 3 days (V2), 7 days (V3), 30 days (V4), and 90 days (V5).



sample sizes (n=26–140) also found small differences between massage techniques, with Chinese massage obtaining better scores.²⁹ There are reviews on pharmacological treatments, postural interventions and physical exercise (like yoga) that were not able to determine the ideal treatment.²⁹

After examining the opinions of manual techniques reported by patients in the literature, these seem to be outlines on acceptability, mainly focused on effectiveness, as is the case for our study where 69% of subjects completed the final questionnaire. Patients thought the explanations of the technique were very clear (74%). Most of them considered it very simple and useful (76.7% and 59%, respectively), and 96.4% of them would recommend it.

Scientific literature suggests that health-related QoL is worse in patients with cervical pain compared to healthy

individuals, although the power of this association differs between studies.³⁰ Our trial found this difference in the utility index to be 0.63, which is similar to other studies of the same pathology, such as that of Stenberg et al., which obtained a EuroQoL-5D utility value of 0.73.²⁵ A study by Rezai et al. employed a population survey by mail to examine the association between the different levels of severity of cervical pain and QoL. Patients with levels II–IV of cervical pain reported a significantly worse QoL, both physical and mental, when compared to healthy individuals (MD CI 95%: -13.9 to -10.8).²⁸

A clinical trial by Jeitler et al. in patients with chronic cervical pain compared two groups during an 8-week intervention; one group did meditation (n=18) whereas the other group followed a program of physical exercise (n=16). In the meditation group, they found a reduction

from 45.5 ± 23.3 mm to 21.6 ± 17.2 mm on a 100-mm pain VAS. The authors concluded that meditation with no physical activity achieves a reduction in pain, but does not improve disability measured using the NDI.²⁶

A study by Southerst et al. found evidence for different supervised programs of physical exercise being effective for handling cervical pain, although they were not able to determine the benefits of one program over another.³⁰ The exercises were to be performed at home and included 12 different sitting postures. At 1-week post-intervention, the clinically significant differences between groups were 23.8 mm (CI 95%: 17.8–29.8) on the pain-at-rest VAS, 21.5 mm (CI 95%: 15.6–27.4) on the pain-on-movement VAS, 18.3 mm (CI 95%: 12.6–24.0) on the discomfort VAS, and 5.7 points (CI 95%: 4.2–7.3) in the NDI. Strength exercises alone were not more effective at decreasing pain, with a reduction of 17.7 mm on the pain VAS (CI 95%: 12.5–22.9) compared to baseline values. Differences in cervical pain and functional ability were clinically significant after 6 months, with improvements of 12.7% (CI 95%: 6.0–19.4) on the VAS. Another study also found differences when conducting physical therapy individually, like the intervention applied in our study, compared to group therapy.^{30,31}

Our outcome is in agreement with a study by Carragee et al., which was a summary of scientific literature (1980–2006) assessing the evidence for non-invasive interventions to treat cervical pain and related disorders. In the case of non-benign cervical pain, the evidence suggests that manual interventions or supervised physical exercises, and perhaps acupressure, are more effective than no treatment or alternative interventions. However, none of the reviewed treatments were clearly more effective than the others, either in the short or long term, and they concluded by recommending further research focusing on strategies for preventing cervical pain in both society and work places.¹⁵

Strengths and limitations

This study suggested that acupressure is an effective technique for improving cervical pain in the long term. In addition, it is easy to apply, has no significant adverse effects, and overall improved the QoL of patients more than pharmacological treatment with analgesics.

Among the limitations of the trial is the fact that it was difficult to isolate the placebo effect of the intervention. Even if the training on the technique was adequate, some patients may not have learnt or applied it according to the instructions given. This would likely have worked against the alternative hypothesis, minimizing the magnitude of effect of the intervention and potentially limiting our ability to demonstrate it. However, for the same reason, observing an effect of the intervention would further support its utility and, moreover, demonstrate effectiveness under realistic conditions.

Another limitation is the potential intergroup interference. Subjects who were trained in the intervention may

have informed other patients who, in turn, self-applied the acupressure technique. To minimize this problem, and once the effectiveness of the intervention is established, workshops will be organized at every healthcare center.

Conclusion

Acupressure, used as a complementary therapy to usual practice, appeared to be an encouraging treatment option for cervical pain of benign origin in primary care that reduces pain and improved QoL utilities in the long term, but did not affect functional ability. It also failed to show short-term differences compared to usual practice. The participants considered the technique simple and easy to apply.

Contributors

SCT, VMG, MLTM, and PDS conceived the trial and coordinated the field research at the healthcare centers (HC). SCT, JMF, and GAC designed the trial. The field research was conducted by the clinical care group EDIDO. SRM and IDC analyzed the data and collaborated with SCT to write the article. SCT, VMG, MLTM, and PDS provided relevant contributions to produce the results and discussion. All authors approved the final version of the manuscript accepted for publication.

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Patient consent

All patients signed informed consent.

Supplemental material

Supplemental material for this article is available online.

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