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An Observational Study on Acupuncture for Earthquake-Related Post-Traumatic Stress Disorder: The Experience of the Lombard Association of Medical Acupuncturists/Acupuncture in the World, in Amatrice, Central Italy

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ABSTRACT

Background and Objective: Earthquakes are associated with severe psychiatric disorders, such as anxiety, depression, and post-traumatic stress disorder (PTSD). Current first-line therapies for PTSD have well-known side-effects. Acupuncture is a complementary approach to help patients cope with mental problems after natural disasters and public health events. This article describes an acupuncture intervention conducted by the Lombard Association of Medical Acupuncturists/Acupuncture in the World in the earthquake-stricken area of Amatrice in Central Italy and measures the effect of acupuncture on earthquake-related pain and psychologic symptoms in the victims.
Methods: The intervention lasted 5 weeks, from September to October 2016. Adult patients with psychologic symptoms and musculoskeletal pain were included. Treatments were performed by experienced medical acupuncturists. A verbal/numerical scale was developed to quantify the effect of intervention. A Wilcoxon rank–sum test was used for comparison of the scores before and after the acupuncture treatment.
Results: Of the patients, 68.3% reported having both pain and psychologic symptoms. The most frequently used meridian points were Kidney (13.17%), followed by Large Intestine (12.46%), Spleen (12.04%) and Gall Bladder (10.34%). After 3 treatments performed in daily sessions, 54.05% and 60.6% of patients reported marked improvements in psychologic and pain symptoms, respectively. Statistical analysis showed a significant difference between the scores reported before the first treatment and after the third treatment, both for pain ($P = 0.000$) and psychologic symptoms ($P = 0.000$). No serious adverse events were reported.
Conclusions: These results suggest that acupuncture could be a useful tool for reducing pain and psychologic symptoms related to earthquakes, but further research is required in this specific area.

Keywords: acupuncture, earthquake, post-traumatic stress disorder (PTSD)

INTRODUCTION

Earthquakes are unpredictable, uncontrolled disasters that cause widespread devastation.[1] Italy is one of the most seismically active countries in Europe; 45% of the Italian territory, with 40% of its population, is at seismic risk.[2] These disasters are associated with severe psychiatric disorders among survivors, such as anxiety, depression and post-traumatic stress disorder (PTSD).

Anxiety can be defined as a mood state, including symptoms such as uncontrollable worry, restlessness, and hypervigilance.[3] Depression is a loss of pleasure in daily activities

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for more than 2 weeks[3] associated with sleep disorders, loss of appetite, sexual dysfunction, and hypoactivity.[4]

PTSD is described as anxiety symptoms that last for more than 1 month. A diagnosis of PTSD requires symptoms from four groups: (1) persistent reexperiencing of the event; (2) avoidant symptoms; (3) a negative change in general responsiveness; and (4) increased arousal and reactivity.[3] Risk factors for the development of psychologic problems include sociodemographic variables, such as being female,[5] having a low income, and having a low perceived level of social support,[1] as well as disaster-related variables, such as close proximity to the epicenter, personal injuries, and deaths of loved ones.[3] The persistence of PTSD symptoms involves medical and social costs, due to increased comorbidities and functional impairments.[6] PTSD is also associated with a higher frequency of somatic symptoms, such as musculoskeletal pain, compared with other psychiatric disorders.[7]

Early identification of the symptoms, and/or prevention and intervention programs can reduce the occurrence of PTSD and other psychiatric comorbidities, thus ensuring mental well-being.[1,3] Current first-line therapies for PTSD include cognitive–behavioral therapy (CBT) and pharmacotherapy.[8] However, noncompliance is quite high, due to emotional reactions after psychotherapy and side-effects from such drugs as selective serotonin reuptake inhibitors (SSRIs).and serotonin–norepinephrine reuptake inhibitors.[6,8,9] Traditional Chinese Medicine (TCM) offers a complementary approach to help patients cope with the mental problems experienced after natural disasters and public-health events. Acupuncture is a TCM therapy that involves insertion of needles into specific points in the body on the energetic meridians.[6,8] This practice could help ameliorate PTSD symptoms, thanks to acupuncture's effects on the autonomic nervous system and on prefrontal and limbic brain structures.[6]

The Lombard Association of Medical Acupuncturists (ALMA) deals with the study, research, dissemination, and teaching of acupuncture and TCM, focusing on emergency and oncology acupuncture. ALMA is recognized by the Italian Federation of Acupuncture Societies (FISA). Acupuncture in the World (AGOM) is a medical association that aims to spread acupuncture in middle- and low-income countries. ALMA and AGOM perform acupuncture interventions in disaster-stricken areas, collaborating with other organizations or associations such as the Civil Protection Department, International Red Cross, and medical or paramedical services.

On the 24th of August, in 2016, a Mw 6.0 earthquake struck Central Italy, devastating Amatrice and several small towns and villages, causing almost 300 deaths and leaving 30,000 people homeless.[10]

The objectives of this article are to describe the acupuncture intervention conducted by ALMA/AGOM in this disaster-stricken area and to measure the effect of the acupuncture on earthquake-related psychologic and somatic symptoms.

MATERIALS AND METHODS

The acupuncture intervention lasted 5 weeks from September to October 2016.

TCM syndrome differentiation was adopted for each patient, based on an interview, observation of the tongue, palpation of the wrist pulses, and palpation of the *Shu-Mu* points.

Adult patients with psychologic symptoms (such as anxiety, depression, and insomnia) and musculoskeletal pain were included. According to current guidelines,[11] exclusion criteria were:

- Patients with severe needle phobias
- Patients with major coagulation dysfunctions and spontaneous bleeding
- Patients with lymphedema due to axillary dissection
- Patients with intracranial deficits due to surgery.

Direct puncturing on masses or ulcers was avoided. Acupuncturists were very cautious with pregnant women, as well as patients with epilepsy or who were disoriented; the medical acupuncturists performed a case-by-case evaluation. Patients were removed from receiving the intervention if they had acupuncture-related adverse reactions and refused treatment.

Treatments were performed by medical doctors trained in a 3-year-school recognized by FISA; after training, all of the medical acupuncturists had at least 3 years of clinical experience.

Informed consent was obtained from all the study subjects.

Each patient received 4 treatments in consecutive daily sessions of 20 minutes each. The treatment room's temperature was 22°C. The depth of needle insertion ranged from 4 to 15 mm. Needles in Bladder Channel *Shu* points were inserted at a 30° angle. Needles were retained for 20 minutes. In selected patients, moxibustion was performed with moxa cones. Cones were burned by one-third (down to 2 cm from the skin) and were removed as soon as the patient reported a feeling of warmth.

A verbal/numerical scale was developed to quantify the effect of the intervention. Before and after acupuncture, both pain and psychologic symptoms were measured on a scale of 1–5 (1 = not at all, 2 = slight, 3 = moderate, 4 = severe, 5 = extremely severe). This scoring was used to represent the effect of acupuncture on musculoskeletal pain and global psychologic state.

Adverse reactions were recorded systematically to determine whether or not they were associated with the treatment.

A Wilcoxon rank-sum test was used for comparison of the scores before acupuncture intervention (baseline) and after the last treatment. STATA Version 11.1 software was used to process the data.

RESULTS

Of the patients who were treated, 80.5% were female, and 68.3% reported both pain and psychologic symptoms (as

shown in Table 1). Only 9.8% of patients suffered from pain exclusively. Of 41 patients, 23 (56.09%) had concurrent therapies. The most commonly used drugs were antihypertensive (26.1%) and anti-inflammatory agents (26.1%). See Table 1.

Table 2 shows the main TCM diagnoses, stratified by gender. Overall, Qi Stasis and Yang Deficiency were the most-common syndromes (32% and 29%, respectively). Qi Stasis was the most-common diagnosis in women (36%), while Yin Deficiency was the most-common diagnosis in men (50%).

On the basis of TCM diagnoses, acupuncturists focused the acupuncture intervention on four main meridians: (1) Kidney; (2) Large Intestine; (3) Spleen; and (4) Gall Bladder. The total number of acupoints used from treatment 1 to treatment 4 was 706. Kidney meridian points were the most-frequently used (93 times, 13.17%), followed by Large Intestine points (88 times, 12.46%), Spleen points (85 times, 12.04%), and Gall Bladder points (73 times, 10.34%). Conception Vessel (63 times, 8.92%) and Governor Vessel (62 times, 8.78%) points were also used, as shown in Table 2. Most meridians had a similar percentage of use from treatment 1 to treatment 4, except Spleen (treatment 1: 14.21% and treatment 4: 8.33%) and Governor Vessel (treatment 1: 10.66% and treatment 4: 6.55%).Three Extra points were used (Ex 322, *Xiayng* 2, and *Bafeng* 2) 41 times (5.81%). Moxa was applied 13 times (1.84%). See Table 2. Although 4 treatments were performed, complete outcome data were collected only for the first 3 treatments (see Discussion section).

The total number of musculoskeletal pain reports was 132 (33 patients). Before treatment (baseline), 23 patients (69.7%) reported ''extremely severe'' or severe'' pain, while no patients reported ''slight'' or ''not at all'' pain. Conversely, after the third treatment 4 patients (12.1%) reported ''extremely severe'' or ''severe'' pain, while 20 patients (60.6%) reported ''slight'' or ''not at all'' pain. After the first and second treatment, the majority of patients—36.4% and 39.4%, respectively—reported ''moderate'' pain. The mean score for perceived pain decreased by 1.67 points from baseline to the third treatment (Table 3).

The total number of psychologic symptoms reports was 148 (37 patients). Before treatment (baseline), 32 patients (86.4%) reported ''extremely severe'' or ''severe'' psychologic symptoms, while no patients reported ''slight'' or ''not at all'' symptoms. Conversely, after the third treatment 7 patients (18.9%) reported ''extremely severe'' or ''severe'' psychologic symptoms, while 20 patients (54.05%) reported ''slight'' or ''not at all'' symptoms. After the first treatment, 19 patients (51.4%) reported ''severe'' psychologic symptoms, while, after the second treatment, 19 patients (51.4%) reported ''moderate'' symptoms, suggesting a delayed effect of acupuncture on psychologic symptoms, compared to musculoskeletal pain. The mean score for psychologic symptoms decreased by 1.73 points from baseline to treatment 3 (Table 4).

Statistical analysis showed a significant difference between scores reported before treatment (baseline) and after treatment 3, for both musculoskeletal pain ($P = 0.000$) and psychologic symptoms ($P = 0.000$).

No serious adverse events were reported in the study patients. Five patients each developed a small hematoma at a needle insertion site, but no patient refused to complete the acupuncture treatment.

Table 1. Characteristics of Patients Stratified by Gender

	Gender						*Total*	
	M			*F*				
Characteristics	n	*% row*	*% col*	n	*% row*	*% col*	n	*% row*
Symptoms								
Pain	1	25.0%	12.5%	3	75.0%	9.1%	4	9.8%
Psychologic	2	22.2%	25.0%	7	77.8%	21.2%	9	22.0%
Both	5	17.9%	62.5%	23	82.1%	69.7%	28	68.3%
Total	8	19.5%	100.0%	33	80.5%	100.0%	41	100.0%
Therapies								
Antihypertensives	1	16.7%	20.0%	5	83.3%	27.8%	6	26.1%
Anxiolytics	2	50.0%	40.0%	2	50.0%	11.1%	4	17.4%
Anti-inflammatories	0	0.0%	0.0%	6	100.0%	33.3%	6	26.1%
Hormonal therapies	0	0.0%	0.0%	3	100.0%	16.7%	3	13.0%
Cholesterol-lowering drugs	2	50.0%	40.0%	2	50.0%	11.1%	4	17.4%
Total	5	21.7%	100.0%	18	78.3%	100.0%	23	100.0%
Age, mean (SD)		65.12 (11.47)			57.33 (14.19)			58.85 (13.93)

M, male; F, female; col, column; SD, standard deviation.

Table 2. TCM Diagnoses, Stratified by Gender

	Gender							
	M			*F*			*Total*	
TCM diagnosis	n	*% row*	*% col*	n	*% row*	*% col*	n	*% col*
Blood Deficiency	0	0%	0%	3	100%	9%	3	7%
Qi Deficiency	1	20%	13%	4	80%	12%	5	12%
Qi Stasis	1	8%	13%	12	92%	36%	13	32%
Yang Deficiency	2	17%	25%	10	83%	30%	12	29%
Yin Deficiency	4	50%	50%	4	50%	12%	8	20%
Total	8	20%	100%	33	80%	100%	41	100%

TCM, Traditional Chinese Medicine, col, column.

Table 3. Acupuncture Meridians Used from Treatment 1 to Treatment 4

		Treatments				
Meridian		*1*	*2*	*3*	*4*	*Total row*
Heart	*n*	2	3	4	3	12
	% col	1.02%	1.73%	2.38%	1.79%	1.70%
Small Intestine	*n*	6	6	5	6	23
	% col	3.05%	3.47%	2.98%	3.57%	3.26%
Pericardium	*n*	6	4	4	7	21
	% col	3.05%	2.31%	2.38%	4.17%	2.97%
Triple Energizer	*n*	4	3	2	6	15
	% col	2.03%	1.73%	1.19%	3.57%	2.12%
Spleen	*n*	28	22	21	14	85
	% col	14.21%	12.72%	12.50%	8.33%	12.04%
Lung	*n*	7	9	8	5	29
	% col	3.55%	5.20%	4.76%	2.98%	4.11%
Large Intestine	*n*	25	20	22	21	88
	% col	12.69%	11.56%	13.10%	12.50%	12.46%
Kidney	*n*	23	25	22	23	93
	% col	11.68%	14.45%	13.10%	13.69%	13.17%
Bladder	*n*	13	15	11	9	48
	% col	6.60%	8.67%	6.55%	5.36%	6.80%
Liver	*n*	12	8	7	13	40
	% col	6.09%	4.62%	4.17%	7.74%	5.67%
Gall Bladder	*n*	20	14	20	19	73
	% col	10.15%	8.09%	11.90%	11.31%	10.34%
Governor Vessel	*n*	21	16	14	11	62
	% col	10.66%	9.25%	8.33%	6.55%	8.78%
Conception Vessel	*n*	16	16	15	16	63
	% col	8.12%	9.25%	8.93%	9.52%	8.92%
Extra 322	*n*	1	0	0	0	1
	% col	0.51%	0.00%	0.00%	0.00%	0.14%
Xiayng 2	*n*	9	7	6	7	29
	% col	4.57%	4.05%	3.57%	4.17%	4.11%
Bafeng 2	*n*	1	2	4	4	11
	% col	0.51%	1.16%	2.38%	2.38%	1.56%
Moxa	*n*	3	3	3	4	13
	% col	1.52%	1.73%	1.79%	2.38%	1.84%
Total col	*n*	197	173	168	168	706

col, column.

Table 4. Severity of Pain Reported from Baseline to Treatment # 3

		Treatment				
Severity of pain		*Baseline*	*1*	*2*	*3*	*Total*
Extremely severe	*n*	10	4	2	1	17
	% col	30.30%	12.12%	6.06%	3.03%	12.88%
	% row	58.82%	23.53%	11.76%	5.88%	100.00%
Severe	*n*	13	10	5	3	31
	% col	39.39%	30.30%	15.15%	9.09%	23.48%
	% row	41.94%	32.26%	16.13%	9.68%	100.00%
Moderate	*n*	10	12	13	9	44
	% col	30.30%	36.36%	39.39%	27.27%	33.33%
	% row	22.73%	27.27%	29.55%	20.45%	100.00%
Slight	*n*	0	5	9	13	27
	% col	0.00%	15.15%	27.27%	39.39%	20.45%
	% row	0.00%	18.52%	33.33%	48.15%	100.00%
Not at all	*n*	0	2	4	7	13
	% col	0.00%	6.06%	12.12%	21.21%	9.85%
	% row	0.00%	15.38%	30.77%	53.85%	100.00%
Total	*n*	33	33	33	33	132
	% row	25.00%	25.00%	25.00%	25.00%	100.00%
Score	Mean (SD)	4 (0.79)	3.27 (1.06)	2.75 (1.06)	2.33 (1.02)	

col, column; SD, standard deviation.

DISCUSSION

Earthquakes have been associated with the development of PTSD. A meta-analysis by Dai et al. showed a combined incidence of PTSD of 23.66% (95% confidence interval: 19.34%–28.27%) among 76,101 earthquake survivors between 1999 and 2013 all over the world.[12] In addition, anxiety and depression are common in earthquake survivors. A study conducted after a Pakistan earthquake found anxiety and depression symptoms in 63% and 54% of women, respectively.[13]

Table 5. Severity of Psychologic Symptoms Reported from Baseline to Treatment # 3

		Treatment				
Severity of psychologic symptoms		*Baseline*	*1*	*2*	*3*	*Total*
Extremely severe	*n*	15	5	3	1	24
	% col	40.5%	13.5%	8.1%	2.7%	16.2%
	% row	62.5%	20.8%	12.5%	4.2%	100.0%
Severe	*n*	17	19	5	6	47
	% col	45.9%	51.4%	13.5%	16.2%	31.8%
	% row	36.2%	40.4%	10.6%	12.8%	100.0%
Moderate	*n*	5	11	19	10	45
	% col	13.5%	29.7%	51.4%	27.0%	30.4%
	% row	11.1%	24.4%	42.2%	22.2%	100.0%
Slight	*n*	0	0	8	15	23
	% col	0.0%	0.0%	21.6%	40.5%	15.5%
	% row	0.0%	0.0%	34.8%	65.2%	100.0%
Not at all	*n*	0	2	2	5	9
	% col	0.0%	5.4%	5.4%	13.5%	6.1%
	% row	0.0%	22.2%	22.2%	55.6%	100.0%
Total	*n*	37	37	37	37	148
	% row	25.0%	25.0%	25.0%	25.0%	100.0%
Score	Mean (SD)	4.27 (0.69)	3.67 (0.91)	2.97 (0.95)	2.54 (1.01)	

col, col; SD, standard deviation.

PTSD can be associated with typical and atypical pain symptoms. Zhang et al. found that the prevalence rates of somatic symptoms—including back pain (29.7%); chest pain (23.1%); and pain in the arms, legs, or joints (41.2%)—were higher in a probable PTSD group, compared with a control group among earthquake survivors from primary and secondary schools ($P < 0.001$).[7]

Previous studies have evaluated the effect of acupuncture on PTSD symptoms. Kim et al. conducted a systematic review of randomized controlled trials (RCTs) and prospective clinical trials to evaluate current evidence for effectiveness of acupuncture for PTSD; 4 RCTs and 2 uncontrolled clinical trials were included.[8] One high-quality RCT showed that acupuncture was superior to wait-list control for addressing post-traumatic symptoms ($P = 0.001$), depression ($P = 0.02$), anxiety ($P = 0.003$), and impairment ($P = 0.03$).[14] An included meta-analysis of electroacupuncture (EA) + moxibustion versus oral SSRIs showed a favorable effect of EA + moxibustion on PTSD ($P < 0.00001$), depression ($P < 0.00001$), and anxiety ($P < 0.00001$).

Furthermore, the researchers focused on important limitations due to suboptimal methodological quality of the primary data. Several recommendations were suggested for future research, emphasizing the need for placebo/sham controls; use of validated scales for psychologic symptoms; and use of high-quality methodological tools, such as randomization, blinding, and sample-size estimation. It should be noted that none of the included studies reported serious adverse events related to acupuncture. Current first-line pharmacotherapies for PTSD have well-known side-effects, such as weight gain, sexual dysfunction, and sleep disturbance during long-term SSRI therapy.[8] CBT makes patients recall traumatic events, thus many of these patients have severe emotional reactions and drop out prematurely because of avoidance behaviors.[6,9] Acupuncture or manual stimulation of acupuncture points[15] could be a complementary or alternative approach, allowing reduction of psychoactive drug doses and emotional impacts from psychologic interventions. Acupuncture is relatively inexpensive; moreover, it has an excellent safety profile. when practiced by trained acupuncturists, and can be easily transported and practiced into an emergency area.

The current study confirmed some of the evidence from the literature. Females comprised 80.5% of the patients, thus confirming female gender was a risk factor for higher levels of psychologic symptoms after earthquakes.[1,5,11,16] In addition, 68.3% of the patients reported both pain and psychologic symptoms, confirming high prevalence rates of pain symptoms among survivors who developed probable PTSD.

After 3 treatments performed in daily sessions, 54.05% and 60.6% of patients reported marked reductions in psychologic and pain symptoms, respectively. In addition, no serious adverse events were reported. These results suggest possible effectiveness of acupuncture for treating PTSD and associated somatic symptoms in emergency situations.

The current study had some limitations.

First, it did not measure the effect of acupuncture on pain and psychologic symptoms after the fourth treatment, although it was performed in all patients.

Second, the PTSD Check List-Civilian Version (PCL-C) was not used to assess PTSD symptoms. This tool has 17 items, each one corresponding to a symptom in the *Diagnostic and Statistical Manual of Mental Disorders Fourth Edition* (DSM-IV)[17] PTSD criteria B (reexperiencing), C (avoidance and emotional numbing), and D (increased arousal). Each symptom is measured on a scale of 1–5, and the final score is used to quantify PTSD severity.[1] The scale used in the current study was identical to the PCL-C one, but all symptoms were gathered in a single, ''global'' numerical value rather than analyzing 17 items. This simplification was strictly due to the characteristics of the intervention in an emergency setting, such as an earthquake-stricken area, where a large number of people required urgent medical and psychological assistance; thus, use of a complete diagnostic tool was not feasible. Instead, an attempt was made to measure and quantify the impact of the intervention in a quick—but somewhat effective—fashion. For the same reasons, measurement of the global score was limited to 3 treatments rather than 4 treatments.

Third, placebo/sham controls and high-quality methodological tools (blinding, randomization, and sample-size estimation) were not used.

However, it should be emphasized that this was an observational study with the goal of describing and evaluating an acupuncture intervention in an emergency context. The results suggest that acupuncture could be a useful tool for reducing psychologic symptoms related to earthquakes, but further research is required in this specific area.

CONCLUSIONS

As early recognition of symptoms and early intervention are key components of a good public-health response to mass trauma, the role of acupuncture should be emphasized in such situations. Acupuncture could be a useful tool for public-health interventions, increasing the speed of recovery of psychologic health in disaster-stricken areas.

AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.

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