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Randomized Controlled Trial of Acupressure for Perception of Stress and Health-Related Quality of Life Among Health Care Providers During the COVID-19 Pandemic: The Self-Acupressure for Stress (SAS) Trial

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Abstract

Background: The efficacy of providing self-acupressure educational materials in reducing stress and improving health-related quality of life (HRQOL) is uncertain. Evidence-based data to recommend for or against self-acupressure as an intervention for reducing stress and improving HRQOL is needed.

Objective: The Self-Acupressure for Stress (SAS) trial evaluates whether providing self-acupressure educational materials would reduce stress and improve HRQOL among health care providers (HCPs).

Design: Randomized behavioral clinical trial.

Setting: The entire study took place remotely.

Participants: One hundred fifty-nine adult HCPs with no prior experience or training in acupressure.

Intervention: The intervention group received self-acupressure educational materials.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.1016/j.ajmo.2023.100056.

Measurements: Primary outcomes were perception of stress measured by the Perceived Stress Scale (PSS), as well as scores on the physical and mental components of the 12-item Short Form Health Survey version 2 (SF-12v2).

Results: From the baseline to midpoint evaluations, the intervention group significantly reduced their PSS score ($P \leq .001$) and increased their SF-12v2 Mental score ($P = .002$) but not their SF-12v2 Physical score ($P = .55$). These findings persisted at the final follow-up (both PSS and SF-12v2 Mental changes from baseline $P < .001$). However the control group also significantly improved their SF-12v2 Mental from baseline to midpoint ($P = .01$) which was maintained at final follow-up ($P = .02$), whereas PSS and SF-12v2 Physical did not significantly change from baseline at either mid or final. Finally, the intervention group improved by significantly more than the control group from baseline to final follow-up for both PSS ($P = .007$) and SF-12v2 Mental ($P = .02$) HRQOL measures.

Limitation: The trial was not blinded.

Conclusion: Among HCPs during the coronavirus disease 2019 (COVID-19) pandemic, the provision of self-acupressure educational materials safely improved self-reported assessments of perception of stress and mental health. Self-acupressure represents a promising intervention for other populations. The study findings support the use of self-acupressure to reduce stress and improve HRQOL.

Trial Registration: ClinicalTrials.gov: NCT04472559.

Keywords

Acupressure; COVID-19; Health care providers; Quality of life; Stress

Introduction

The emergence of coronavirus disease 2019 (COVID-19) revealed major inadequacies within our health care system, including heightened levels of stress and burnout among providers. [1,2] This population is disproportionately stressed and affected by the COVID-19 pandemic due to an increased risk of personal exposure and the inability of the health care system to accommodate a surge in critically ill patients. [3,4] It is important that health care providers (HCPs) maintain their health and manage stress, both for their own wellbeing and for their ability to continue to work in challenging circumstances. Increased stress is known to suppress immune function and thus susceptibility to illnesses such as COVID-19.[5]

Acupressure has been used in traditional Chinese medicine (TCM) for more than 2000 years. [6] It is a method of applying pressure to discrete points on the body that can be performed by a clinician or self-administered for a variety of indications including reduction in stress-related symptoms. [7] Among other things, acupressure has been shown to regulate activity of the hypothalamic-pituitary-adrenocortical axis, thereby modulating levels of cortisol, endorphins, and serotonin—hormones that affect mood, nociception, and stress. [8]

One randomized controlled trial found that stimulation of acupressure points reduced stress levels among nurses treating COVID-19 patients. [9] Another randomized trial found that

auricular acupressure was effective at reducing burnout and secondary traumatic stress. [10] A third randomized trial found that self-administered acupressure increased both sleep quality and quality of life in breast cancer patients. [11] Further, a metaanalysis and systematic review of multiple acupressure trials found moderate evidence demonstrating a significant association between acupressure and lowered pain intensity in cancer patients. [12]

We previously conducted a randomized controlled trial of acupressure for the treatment of chronic constipation. [13] Participants in that trial reported statistically significant and clinically meaningful improvements in the primary outcome, Patient Assessment of Constipation Quality of Life (PAC-QOL). In addition, participants experienced a statistically significant improvement in health-related quality of life (HRQOL) in both physical and mental scores according to the abridged practical version of the 12-item Short Form Health Survey (SF-12v2).

While our previous trial found self-acupressure improved HRQOL, it involved in-person training. This study evaluated whether an entirely remote and standardized training could have similar efficacy. If so, it may serve as a promising intervention to improve HRQOL on a broader scale.

Methods

Participants

Eligible participants were self-reported adult (over 17 years old) HCPs that did not meet any of the following exclusion criteria prior to enrollment: physically unable to participate (eg, from severe arthritis); cognitively unable to participate (eg, from dementia); unable to provide informed consent; pregnant (two acupressure points used in the study are contraindicated during pregnancy, as they may potentially induce labor) [14]; or with previous experience or training in acupressure. The Self-Acupressure for Stress (SAS) study protocol was approved by the institutional review board at UCLA (IRB#20-000773), registered with ClinicalTrials.gov (Identifier: NCT04472559), and all participants provided written informed consent.

Study Design and Intervention

The study was a randomized behavioral trial, with each eligible participant randomly assigned to either receive educational material in self-acupressure (intervention) or placed on a waitlist to receive instruction after the conclusion of the trial (control) (Figure 1). No monetary compensation was provided to participants. Potential participants were recruited from online advertisements and screened for eligibility from June 2021 to April 2022. Emails soliciting participation were sent throughout UCLA Health to HCPs, as well as nationally to interest groups of physicians and nurses. Fliers were also posted at various locations within UCLA Health. Eligible participants who met all study criteria were enrolled on a rolling basis after they remotely completed the informed consent process and a baseline survey. The sample size of 80 per group at baseline was determined by conducting a power analysis based on data obtained from the previous randomized controlled trial of acupressure for the treatment of chronic constipation to allow us to reliably detect (> 80% power)

standardized effect size differences of 0.45 between groups using the t-test (two-tailed, alpha = 0.05) for continuous measures and 22% differences between groups for binary measures (eg, 39% vs 61%) using the chi-square test (two-tailed, alpha = 0.05). [13]

Computer-generated randomization by Qualtrics was not stratified, with intervention assignments made in random permuted blocks of size 2: for every block of two participants, there was 1 control and 1 treated participant in random order. Study analyses adhered to the guidelines of Intent-to-Treat (ITT) analysis, such that the groups that participants were randomized to were maintained throughout the study. [15] Subjects in the control group did not receive any intervention. Subjects in the intervention group were provided written instructions and a video by a licensed acupuncturist (LK) demonstrating the location of each acupoint based on TCM theory: Large Intestine 4 (LI4 or Hegu), Pericardium 6 (PC6 or Neiguan), Gall Bladder 20 (GB20 or Fengchi), and Spleen 6 (SP6 or Sanyinjiao). We developed this treatment strategy based on both the clinical experiences of the research team and other studies that evaluated these acupoints. [16–18] The educational materials detailing the acupressure techniques utilized in the intervention all appear in Appendix 1 in the Supplement. Intervention group subjects were instructed to self-stimulate the 4 different acupoints bilaterally for about 30 seconds 2 times a day for a total of approximately 8 minutes of daily therapy.

All participants completed an initial survey immediately following the informed consent process. One month after completing this initial survey, subjects in both groups were asked to complete a follow-up midpoint survey. Two months after completing the initial survey subjects in both groups were asked to complete a final survey. Participants who did not submit surveys in a timely fashion were given email and phone reminders. The trial was stopped 8 weeks after the enrollment of the final participant.

The duration of treatment was selected by the research team to accommodate busy HCPs and improve adherence. Fidelity to the intervention was optionally reported by participants which did not result in sufficient data for analysis.

Outcome Measures

The primary outcome measures were the Perceived Stress Scale (PSS) and the Short Form Health Survey version 2 (SF-12v2). The PSS is a survey consisting of 14 items in which participants assess the degree of stress present in recent life events, with the summation of scores in each item generating a combined PSS score. [19] A higher score indicates greater levels of perceived stress, and greater PSS scores correlate with increased levels of daytime cortisol, a stress biomarker. [20] Containing 12 questions from the SF-12v2 Health Survey, the SF-12v2 is a validated multipurpose tool for computing scores both physically (SF-12v2 Physical) and mentally (SF-12v2 Mental). SF-12v2 Physical and SF-12v2 Mental both range from 0 to 100, where higher scores indicate better quality of life. [21]

Statistical Analysis

Participant characteristics and study variables at baseline were summarized by group (control/intervention) using mean (standard deviation) or frequency (%) (Table 1). We measured our primary outcomes of interest (PSS, SF-12v2 Physical, SF-12v2 Mental) at

baseline, midpoint, and final time points. First, within-group changes (from baseline to midpoint and baseline to final) were carried out for each group using the paired samples t-test. Next, differences in changes (from baseline to mid and baseline to follow-up) were compared between groups using the 2-sample t-test. We also ran the analysis using the analysis of covariance (ANCOVA) approach and obtained similar conclusions as the 2-sample t-test. Statistical analyses were conducted using IBM SPSS V28 (Armonk, NY) and *P*-values < .05 were considered statistically significant.

Results

We found no significant differences at baseline in characteristics or study outcomes between groups (Table 2). Participants also identified with one category of HCP or could self-describe their health care background (Supplementary Table 1, available online).

When looking at within-group changes (from baseline) the control group improved on average by 2.74 units ($P = .01$) at the midpoint and 4.12 units ($P = .02$) at the final for the SF-12v2 Mental component but no significant changes from baseline in the PSS or SF-12v2 Physical component (Table 2). However, the intervention group improved by 5.7 units on average ($P = .002$) at the midpoint and 10.1 units ($P < 0.001$) at the final for the SF-12v2 Mental component and also reduced their PSS scores by nearly 4 units ($P < 0.001$) at the midpoint and 4.7 units at the final compared to baseline measures. There was no significant change in the SF-12v2 Physical component scores from baseline.

Finally, we found that the intervention group reduced their PSS score more than the control group when looking at baseline to midpoint changes: a reduction average of 3.2, with a 95% confidence interval (CI) of 1.4–5.0, and $P < .001$. However, no significant difference was observed for SF-12v2 Physical ($P = .43$) or SF-12v2 Mental ($P = .12$) scores (Table 3). At the final time point, we found that not only was the PSS difference maintained by the intervention group (3.2, 95% CI 0.9–5.5, $P = .007$) but also that the SF-12v2 mental health component changes were significantly higher in the intervention group compared to the control group (6.0, 95% CI 1.0–11.0, $P = .02$). There was no significant difference in changes between groups looking at the SF-12v2 physical component ($P = .08$). In addition, no participant reported any adverse or safety events throughout the duration of the study (Figure 2).

Discussion

The SAS is the first randomized trial with sufficient statistical power to test the effect of providing self-acupressure educational materials on perceptions of stress and HRQOL. The trial has produced evidence of intervention effects that are statistically significant, and no participant in the trial reported an adverse event. The intervention was exceptionally cost-effective, as generic educational materials were provided without any in-person training.

However, the SAS has important limitations. The sample size is modest, as fewer than 100 participants completed the study. Significantly more participants dropped out from the intervention group ($n = 49$) vs the control group ($n = 36$). Also, the trial was not blinded. Participants in the intervention group knew that they were performing self-acupressure. It is

possible that the intervention group improvements were due in whole or part to a placebo effect. As there was no interaction between the researchers and participants, the fact that the researchers were unblinded should not have affected the results.

In addition, the benefits experienced by intervention group participants may have varied based on the degree to which they practiced. Outcomes may also vary based on the specific acupressure points being selected and the duration of stimulation. There are also a wide variety of acupressure techniques, methods, and applications and other forms of acupressure may not have the same efficacy. Similarly, other behavioral interventions like cardiovascular exercise, meditation, and yoga may offer similar benefits. Finally, participants self-identified as HCPs. While about half of participants self-identified as nurses (73 out of 159), with physicians as the next most common category of HCP (35), participants identified with a wide range of categories, including categories with different licensure and regulatory requirements and scopes of practice, and some participants (3) identified as students. It is possible that the benefits experienced by intervention group participants varied based on what type of HCP they identified with.

As with all trials, there are also questions of whether the intervention effects are generalizable to other conditions and populations. The SAS study only evaluated HCPs during the COVID-19 pandemic. It is possible that this group disproportionately benefited from the intervention, perhaps because the population was experiencing relatively high levels of stress or was relatively motivated to engage in a behavioral intervention as HCPs. In future studies, it will be valuable to explore the efficacy of providing self-acupressure educational materials to the general public and for a variety of indications. It will also be valuable to evaluate whether the improvements seen in this trial are sustained over an extended period, with or without continued practice.

Conclusions

Provision of self-acupressure educational materials was effective at reducing stress and improving mental health. Clinicians should consider providing these materials where appropriate, together with other interventions as indicated.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Clinical Significance

- Among health care providers during the coronavirus disease 2019 pandemic, the provision of self-acupressure educational materials safely improves self-reported assessments of perception of stress and mental health.
- Participants in a randomized controlled trial experienced improvements in perceptions of stress and health-related quality of life simply from receiving generic instruction regarding self-acupressure—without the need for clinician involvement.
- Self-acupressure represents a promising intervention for other populations.
- The study findings support the use of self-acupressure to safely reduce stress and improve health-related quality of life.

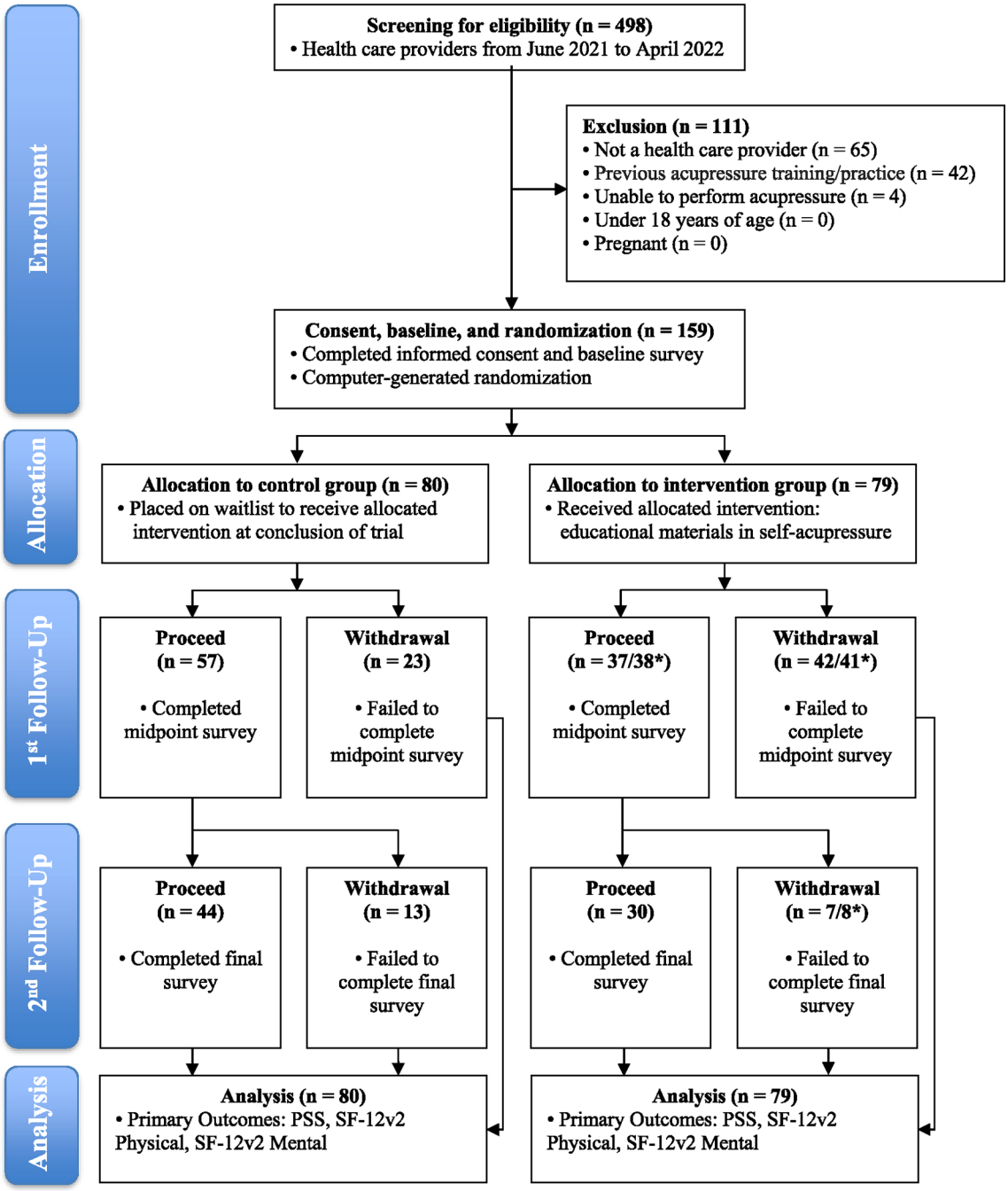

Figure 1.

Participant enrollment and follow-up. *One participant completed PSS, but not SF-12v2 physical/mental at midpoint.

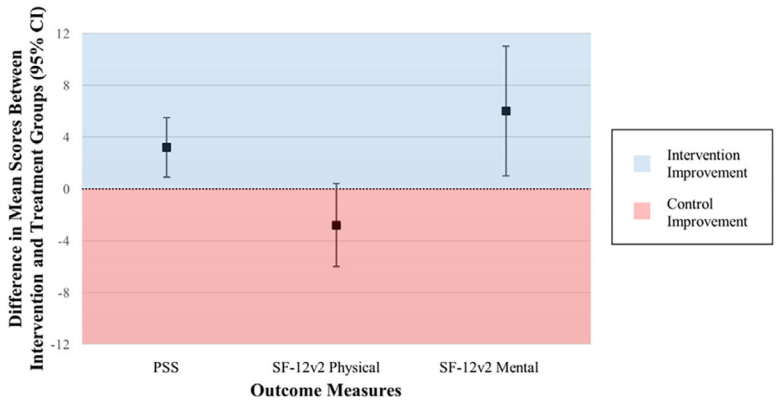

Figure 2.

Difference in mean scores across three outcome measures (use color). A significant difference in mean PSS and SF-12v2 Mental scores was observed between intervention and control groups, at the 95% confidence level. No significant difference in mean SF-12v2 Physical score was observed.

Table 1

Baseline Participant-Reported Demographic Data.

Participant characteristics	Control[*] (*n* = 80)	Intervention[*] (*n* = 79)	*P*-value
Age	42.2 (11.8)	39.7 (11.0)	.17
Sex/gender			.34
Female	67 (83.8%)	72 (91.1%)	
Male	12 (15.0%)	6 (7.6%)	
Nonbinary	1 (1.3%)	1 (1.3%)	
Race[†] and ethnicity			
Hispanic or Latino	10 (12.5%)	18 (22.8%)	.09
American Indian or Alaska Native	0 (0%)	4 (5.1%)	.04
Asian	31 (38.8%)	25 (31.6%)	.35
Black or African American	3 (3.8%)	3 (3.8%)	> .99
Native Hawaiian or Other Pacific Islander	1 (1.3%)	1 (1.3%)	> .99
White	41 (51.2%)	40 (50.6%)	.94
Unknown	5 (6.3%)	10 (12.7%)	.17

[*] Control and intervention ages are reported as mean (standard deviation). Likewise, sex/gender and race and ethnicity are reported as frequency (%).

[†] Race totals do not add up to the total in each group because some participants identified with more than one race.

Table 2

Participant-Reported Within-Group Changes from Baseline.

Outcome measures	Baseline	Mid/final	Diff score*	*P*-value
Control at midpoint (*n* = 57)				
PSS	17.46 (4.29)	16.67 (4.85)	0.80 (4.08)	.15
SF-12v2 Physical	53.94 (7.22)	54.28 (7.64)	−0.34 (5.78)	.66
SF-12v2 Mental	36.69 (9.31)	39.43 (9.51)	−2.74 (8.11)	.01
Intervention at midpoint (*n* = 38/37)				
PSS	18.29 (4.31)	14.32 (4.73)	3.97 (4.70)	< .001
SF-12v2 Physical	53.75 (7.61)	52.96 (7.39)	0.79 (7.95)	.55
SF-12v2 Mental	37.07 (11.34)	42.77 (10.59)	−5.70 (10.26)	.002
Control at final (*n* = 44)				
PSS	17.45 (4.26)	16.02 (5.37)	1.43 (5.10)	.07
SF-12v2 Physical	53.40 (6.51)	54.64 (7.89)	−1.24 (6.27)	.20
SF-12v2 Mental	37.59 (9.53)	41.71 (10.40)	−4.12 (11.24)	.02
Intervention at final (*n* = 30)				
PSS	19.17 (4.09)	14.50 (4.22)	4.67 (4.56)	<.001
SF-12v2 Physical	53.20 (8.14)	51.60 (6.98)	1.60 (7.49)	.25
SF-12v2 Mental	35.83 (11.33)	45.93 (8.10)	−10.10 (9.49)	<.001

*Scores are reported as mean (standard deviation).

Table 3

Participant-Reported Between-Group Changes from Baseline.

Outcome measures	Control	Intervention	Score difference from baseline*	*P*-value†
Midpoint				
PSS	−0.8 (4.1)	−4.0 (4.7)	3.2 (1.4, 5.0)	< .001/.001
SF-12v2 Physical	0.3 (5.8)	−0.8 (7.9)	1.1 (−1.7, 3.9)	.43/.35
SF-12v2 Mental	2.7 (8.1)	5.7 (10.3)	−3.0 (−6.7, 0.8)	.12/.07
Final				
PSS	−1.4 (5.1)	−4.7 (4.6)	3.2 (0.9, 5.5)	.007/.029
SF-12v2 Physical	1.2 (6.3)	−1.6 (7.5)	2.8 (−0.4, 6.0)	.08/.051
SF-12v2 Mental	4.1 (11.2)	10.1 (9.5)	−6.0 (−11.0, −1.0)	.02/.019

*Score difference from baseline is reported as mean difference (95% CI).

†*P*-value is reported as two sample t-test *P*-value/ANCOVA *P*-value.