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# Effect of hand and foot surface stroke massage on anxiety and vital signs in patients with acute coronary syndrome: A randomized clinical trial

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ABSTRACT

*Background and objectives:* Anxiety affects various body systems, which leads to an increase in respiratory rate, heart rate, blood pressure, and myocardial oxygen demand. The aim of this study was to investigate the effect of hand and foot surface stroke massage on the level of anxiety and vital signs in patients with acute coronary syndrome (ACS).

*Materials and methods:* The single-blind clinical trial was performed on 70 patients with ACS. The patients were randomly assigned to the case and control groups. Anxiety levels were controlled 30 min before and 15 min after the intervention. The vital signs were checked in the two groups before, immediately after, 60 min, and 90 min after the intervention. The data were analyzed using SPSS software, descriptive statistics (mean ± standard deviation), independent *t*-test, paired *t*-test, and chi-square test.

*Results:* No significant difference was observed in the patients' levels of anxiety, systolic blood pressure, diastolic blood pressure, respiratory rate, and pulse rate before the intervention. However, after the intervention, the mean changes in the levels of anxiety, blood pressure, heart rate, and respiratory rate were significant.

*Conclusion:* Hand and foot massage can be a useful nursing intervention in attenuating anxiety levels and improving the vital signs in patients.



## 1. Introduction

Acute coronary syndrome (ACS) is an urgent condition that requires emergency intervention and occurs as a result of impaired coronary circulation; in the absence of timely actions, this syndrome can cause death. The American Heart Association reported that about 40.5% of the population has cardiovascular disease and 34% die from the disease each year [1]. Cardiovascular disease is the leading cause of death in the United States [1]. According to the Ministry of Health and Medical Education of Iran, the annual incidence rate of myocardial infarction in Iran is 64.9 per 100,000 people [2]. ACS and myocardial infarction are considered to be the main causes of hospitalization of patients in coronary care units (CCU). However, 50–70% of these patients experience anxiety attacks due to their fear of death [3,4].

Hospitalization creates anxiety among patients [5]. In care units, the unfamiliar environment, equipment, diagnostic procedures, clinical symptoms and pain, lack of social support, and unpredictability of the future can result in stress, anxiety, and hemodynamic instability in patients [4,6]. Stress and anxiety affect the nervous system by stimulating the sympathetic system, which increases the secretion of epinephrine and norepinephrine, and triggering the pituitary–hypothalamic axis, which increases the secretion of cortisol [7]. Subsequently, other organ systems, such as the cardiovascular, endocrine, pulmonary, and nervous systems, become involved and cause changes in consciousness, respiration, heart rate, blood pressure, and platelet aggregation [6,8–10]. Anxiety attacks stimulate the sympathetic system and, thus, cause a decrease in renal blood flow, which is followed by an increase in renin and angiotensin. Angiotensin leads to systemic

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vasoconstriction, an increase in systemic blood pressure, and a decrease in systemic blood flow [11]. Anxiety also results in a high myocardial oxygen demand and an increased risk of cardiac dysfunction, dysrhythmia, ischemia, and death [3,12], as well as an increased incidence of myocardial infarction without angina in patients with cardiovascular disease [8].

Due to the negative effects of anxiety on the body, anxiety-relieving techniques are needed in CCUs. The current therapy given to attenuate anxiety in patients is medical treatments, such as sedative medications. However, because of the side effects of drugs, the use of complementary and alternative therapies is recommended to reduce anxiety in patients [3]. One of the most common and popular alternative therapies and an important part of nursing [13,28] is massage therapy, which is the scientific manipulation of soft tissues to relieve pain and anxiety in patients [13]. Studies have reported contradictory results about the effect of massage on vital signs. For example, Wang et al. found that hand and foot massage significantly reduced postoperative pain, but did not cause significant changes in blood pressure, respiratory rate (RR), or heart rate [14]. In 2006, Cambron et al. reported that massage increased diastolic blood pressure (DBP) and decreased systolic blood pressure (SBP) [15], while in 2015, Kanitz et al. stated that massage therapy had no significant effect on the level of salivary cortisol, a stress hormone, in patients [16]. Pinar et al. found that massage caused significant changes in cortisol levels ($p = 0.01$), blood pressure, and sleep quality in cancer patients [17]. Asadollahi et al. observed that massage had a significant effect on the level of cortisol in patients admitted to intensive care units [18]. Gholami et al. showed that stroke massage led to a significant decrease in SBP in healthy women, but did not affect the level of anxiety [19]. Kordi et al. stated that massage reduced pain and anxiety in patients because it triggered the secretion of endorphin, which had an analgesic effect [20,21]. Bahrami et al. showed that massage improved SBP in participants, but had no significant effect on DBP [22].

In this study, we aimed to evaluate the effect of hand and foot massage therapy on the level of anxiety and vital signs in patients with ACS. The whole body does not have to be bare for hand and foot massages, unlike whole body massages. These organs have many neural receptors [20]. Manual lymphatic drainage (MLD) leads to reduced recurrence of deep vein thrombosis [23]. To the best of our knowledge, there are no studies that have investigated the effect of hand and foot massage on anxiety and vital signs in patients with ACS.

## 2. Materials and methods

### 2.1. Study design

This randomized clinical trial was performed on 70 patients with ACS. These patients had been referred to Hajar Hospital in Shahrekord, Iran.

### 2.2. Data collection

Data were collected from July 6, 2017 to August 16, 2017 at Hajar Hospital, which is affiliated with Shahrekord University of Medical Sciences, Iran.

### 2.3. Inclusion criteria

Patients were over 18 years old, conscious, and had been diagnosed with ACS by a physician based on clinical symptoms, electrocardiogram (ECG) changes, and laboratory tests. They also did not have severe anxiety according to the physician, were not mentally impaired, had no history of taking warfarin due to the probability of bleeding, had a pulse rate (PR) > 60 beats per min and <110 beats per min, had no history of respiratory arrest in the last 72 h, did not have a pacemaker (due to hemodynamic instability), had no amputations, their DBP was not ≥110 mm Hg and their SBP was not ≥180 mm Hg, did not have cardiac arrhythmias, such as ventricular tachycardia or ventricular fibrillation, had no history of bone fractures in the previous 2 months, had not been diagnosed with a clotting disorder or deep vein thrombosis, had no dialysis fistula in the upper limb, did not take hypnotic drugs, opioids, benzodiazepines, or alcohol, and had received no spinal anesthesia in the last 4 h. The patients were willing to participate in the research, had healthy areas for massage (i.e., no red and swollen skin), and had no skin lesions or healing wounds [3,14,25,26].

### 2.4. Exclusion criteria

The exclusion criteria were that the participants were unwilling to cooperate in the research project and that they had obtained scores >65 for the Spielberger Anxiety Inventory. In this way, patients with severe and very severe anxiety were omitted from the study [34].

### 2.5. Subjects

The current study was conducted on 70 patients with ACS. The convenience sampling method was used to select study participants from individuals who met the inclusion criteria. The confidentiality of information, the importance of volunteering and cooperating during the study, and the study objectives were explained to each participant prior to the study. The research methodology, including the way of selecting participants, was also explained. Patients were given enough time to consult with their relatives to declare their intention to participate and cooperate in the study. The patients completed a written consent to participate in the research project.

Participants were randomly assigned to either the case group or the control group. Two envelopes, one for the case group and one for the control group, were used to randomize the participants in each group. The participants selected one of the two envelopes to determine which group they were in.

### 2.6. Sample size

The study sample size was determined to be 32.5 in each group according to the following equation:

$$n = \frac{\left(z_{1-\alpha} + z_{1-\beta}\right)^2 \left(s_1^2 + s_2^2\right)}{d^2}$$

where $S_1 = 5$, $d = 4$, $S_2 = 5$, $1 - \alpha = 0.95$, and $1 - \beta = 0.90$. Finally, 35 subjects were considered in each group by taking 10% attrition [21].

### 2.7. Procedures

Initially, patients in both groups provided their histories verbally. The Spielberger Anxiety Inventory was completed for the patients 30 min before the intervention; the vital signs of the patients were controlled and recorded in a checklist. A skin hypersensitivity test was performed on each patient's arm in the case group 30 min before the intervention. The patient was asked about a possible skin allergy to almond oil. In the absence of a skin allergy, the patient was placed on a bed in a supine position with a pillow under their feet. A massage was first performed on the hands from

the palm to the shoulder and then on the legs from the sole of the foot to the quadriceps femoris muscle without focusing on a particular point for 5 min on each organ, for a total of 20 min. Bedside curtains were used to provide privacy for the patients. In order to implement the compliance audit that was approved by the Islamic Consultative Assembly on November 1, 1998 and based on the principles of the Islamic Republic of Iran, the massages were carried out by homogeneous and trained personnel. The patient's vital signs, including SBP, DBP, heart rate, and RR, were checked 30 min before, immediately after, and 60 min and 90 min after the massage. The Spielberger Anxiety Inventory was completed by the patient 15 min after the massage. In the control group, verbal communication was used only for recording the patient's history. According to the timeline, the vital signs were controlled and the questionnaire was completed.

### 2.8. Study techniques

In this study, stroke and Swedish massages (tight strokes) were used. The stroke massage was executed on the surface of the skin and was applied without any pressure on the patient's body. The stroke massage involved the manipulation of soft tissues to increase local blood circulation and lymphatic drainage for 3–10 min (about 60 movements per min), which was used to start and end the massage. During the stroke massage, the hands were placed completely on the limb and moved from the end to the beginning slowly and rhythmically without applying pressure to the muscle [5,27]. In this study, sweet almond oil was used to lubricate the skin [6].

### 2.9. Data collection tools

The data were collected in three parts. The first part involved collecting the patients' demographic information, including age, gender, educational level, marital status, occupation, and history of hospitalization. The second part involved completing the Spielberger Anxiety Inventory. The Spielberger State Inventory is a standard questionnaire that has been approved by the professors of Tehran University; its reliability, as assessed on the basis of Cronbach's alpha coefficient, was 94–99% in Iran [4,21]. The questionnaire had 20 questions about the level of anxiety. For questions 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20, which involve items with a positive attitude, the points were as follows: not at all = 4, somewhat = 3, moderately so = 2, and very much so = 1. For questions 3, 4, 6, 7, 9, 12, 13, 14, 17, and 18, which involve items with a negative attitude, the points were as follows: not at all = 4, somewhat = 3, moderately so = 2, and very much so = 1. The total scores indicated the level of anxiety: 20–42 = mild anxiety, 43–64 = moderate anxiety, and 65–80 = severe anxiety [5,13,21].

The third part was a checklist for recording the vital signs of the patients. The right radial artery was used to measure the PR and the right hand was used to measure the blood pressure in the supine position using an Aplicado pressure gauge [29]. Chest observations and a Tissot watch [21] were utilized to check the respiration.

### 2.10. Ethical considerations

The Ethics Committee of Shahrekord University of Medical Sciences approved this research (Code of Ethics: IR. SKUMS.-REC.1396.83). The registry code in the Iranian clinical trial registry center was IRCT2017070134830N1. All participants were enrolled in the study after obtaining information on the study objectives and methodology and after completing the informed consent form. During the study, the privacy of the participants was respected and the participants were free to leave the study in case of an unwillingness to cooperate.

### 2.11. Statistical analysis

In this study, SPSS version 23 software was used to analyze the data. The chi-square test and the independent *t*-test were applied to evaluate the normal distribution of data in the case and control groups. The chi-square test was used to assess the normal distribution of the data in terms of the confounding variables; the results are shown in Table 1. The independent *t*-test was used to test the normal distribution of the data before the intervention in the two groups; the results are shown in Table 2. The changes in the vital signs and anxiety levels of the participants in the case and control groups at specified intervals were analyzed using the paired *t*-test and are presented in Table 3. A comparison of the mean changes in the anxiety scores of the participants before and 15 min after the intervention for the case and the control groups using the independent *t*-test can be observed in Table 4. The comparison of the mean changes in the vital signs of the participants before, immediately after, 60 min, and 90 min after the intervention in the case and control groups using the independent *t*-test are shown in

**Table 1**
Demographic and clinical characteristics of participants in the case and control groups.

| Variable | Total number of participants | | Case group | | Control group | | P value |
|---|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage | |
| **Educational level** | | | | | | | |
| Illiterate | 34 | 48.6 | 20 | 57.1 | 14 | 40 | 0.202 |
| Half-educated | 23 | 32.9 | 9 | 25.7 | 14 | 40 | |
| Diploma | 9 | 12.9 | 5 | 14.3 | 4 | 11.4 | |
| Higher education | 4 | 5.7 | 1 | 2.9 | 3 | 8.6 | |
| Total | 70 | 100 | 35 | 100 | 35 | 100 | |
| **Occupation** | | | | | | | |
| Housekeeper | 27 | 38.6 | 15 | 42.9 | 12 | 34.3 | 0.215 |
| Self-employed | 18 | 25.7 | 11 | 31.4 | 7 | 20 | |
| Civil servant | 3 | 4.3 | 0 | 0 | 3 | 8.6 | |
| Retired | 21 | 30 | 9 | 25.7 | 12 | 34.3 | |
| Unemployed | 1 | 1.4 | 0 | 0 | 1 | 2.9 | |
| **Sex** | | | | | | | |
| Female | 28 | 40 | 16 | 45.7 | 12 | 34.3 | 0.333 |
| Male | 42 | 60 | 19 | 54.3 | 23 | 65.7 | |
| **History of taking blood pressure suppressants** | | | | | | | |
| Yes | 44 | 62.9 | 20 | 57.1 | 24 | 68.6 | 0.326 |
| No | 26 | 37.1 | 15 | 42.9 | 11 | 31.4 | |

**Table 2**
Data analysis using the independent *t*-test before the intervention to test normal distribution in the two groups.

| Variable | Group | Mean ± SD | P value |
|---|---|---|---|
| Age | Case | 63.08 ± 11.16 | 0.46 |
| | Control | 61.22 ± 9.81 | |
| Anxiety level | Case | 30.00 ± 3.74 | 0.36 |
| | Control | 29.17 ± 3.77 | |
| SBP | Case | 129.86 ± 18.53 | 0.35 |
| | Control | 125.71 ± 18.59 | |
| DBP | Case | 76.43 ± 8.96 | 0.96 |
| | Control | 76.57 ± 12.35 | |
| RR | Case | 21.97 ± 3.38 | 0.26 |
| | Control | 21.17 ± 2.45 | |
| PR | Case | 72.06 ± 10.24 | 0.12 |
| | Control | 75.91 ± 10.09 | |

SBP = systolic blood pressure, DBP = diastolic blood pressure, RR = respiratory rate, PR = pulse rate.

Table 5. The significance level was considered to be less than 0.05.

## 3. Results

The results of the chi-square test and the independent *t*-test showed that the distribution of data in the case and control groups was identical. The minimum age of the 70 participants was 42 years and the maximum age was 84 years; the mean age of the participants was 62.16 ± 10.47 years. There was no significant difference in the anxiety level between the two groups before the intervention (P = 0.36; Table 2). The mean anxiety scores before the intervention in the case group was 30.00 ± 3.74, which reached 21.86 ± 1.68 15 min after the intervention (P = 0.000); the initial mean anxiety score in the control group was 29.17 ± 3.77, which reached 28.14 ± 5.59 15 min after the intervention (P = 0.198; Table 3). The mean anxiety score of the participants before the intervention compared with the scores 15 min after the intervention was −8.14 ± 3.20 in the case group and −1.03 ± 4.64 in the control group (P = 0.000; Table 4). These results indicated that there was a significant difference in the level of anxiety between the case and control groups after the intervention.

**Table 4**
Comparison of the mean changes in the anxiety scores of the participants before and 15 min after the intervention in the case and the control groups using the independent *t*-test.

| Variable | Group | Mean ± SD difference | *t*-test result |
|---|---|---|---|
| Anxiety score 2-1 | Case | −8.14 ± 3.20 | P = 0.000 |
| | Control | −1.03 ± 4.64 | |

2-1: Score 15 min after the intervention compared with before the intervention.

There was no significant difference between the vital signs, which included SBP, DBP, PR, and RR, of the participants in both groups before the intervention (Table 2). However, the changes in the vital signs of the participants in the case group showed a significant difference compared with the control group (Table 3). The comparison of the mean changes in the mean score of the vital signs of the participants in the case group before, immediately after, 60 min, and 90 min after the intervention showed a significant difference compared with the control group (Table 5).

## 4. Discussion

The findings of this research revealed that hand and foot surface stroke massage significantly attenuated the anxiety level, RR, PR, and blood pressure in the case group. The independent *t*-test results showed there was a significant difference between the case and the control groups. We found no available study on the effect of hand and foot massage on the anxiety and vital signs of patients with ACS. In contrast to our study, one clinical study used whole body massage to evaluate the effect of massage therapy on the anxiety of male patients hospitalized in CCU; the massage therapy was performed by a nurse and the patient's companion. The results of the clinical study indicated that massage in both ways reduced the state of anxiety in the patients [4]. Other studies also reported that massage could reduce the level of anxiety in patients [18,29] because it improves blood pressure, RR, and heart rate [5,25,30,31]. It also attenuates pain, anxiety, and muscle tension [32].

**Table 3**
Changes in anxiety levels and vital signs of participants in the case and control groups at specified intervals using the paired *t*-test.

| Variable | Group | Before intervention | Time | Group | Mean ± SD | P value |
|---|---|---|---|---|---|---|
| Anxiety level | Case | 30.00 ± 3.74 | 15 min after the intervention | Case | 21.86 ± 1.68 | 0.000 |
| | Control | 29.17 ± 3.77 | | Control | 28.14 ± 5.59 | 0.198 |
| SBP | Case | 129.86 ± 18.53 | Immediately after the intervention | Case | 121.71 ± 15.53 | 0.000 |
| | | | | Control | 125.14 ± 18.41 | 0.774 |
| | | | 60 min after the intervention | Case | 122.26 ± 14.87 | 0.001 |
| | | | | Control | 125.00 ± 16.54 | 0.700 |
| | Control | 125.71 ± 18.59 | 90 min after the intervention | Case | 120.57 ± 13.38 | 0.000 |
| | | | | Control | 124.71 ± 16.71 | 0.589 |
| DBP | Case | 76.43 ± 8.96 | Immediately after the intervention | Case | 71.71 ± 9.47 | 0.000 |
| | | | | Control | 78.00 ± 11.32 | 0.287 |
| | | | 60 min after the intervention | Case | 69.29 ± 9.64 | 0.000 |
| | | | | Control | 78.00 ± 10.86 | 0.365 |
| | Control | 76.57 ± 12.35 | 90 min after the intervention | Case | 69.43 ± 8.72 | 0.000 |
| | | | | Control | 76.71 ± 10.57 | 0.891 |
| PR | Case | 72.06 ± 10.24 | Immediately after the intervention | Case | 66.86 ± 8.11 | 0.000 |
| | | | | Control | 76.11 ± 11.99 | 0.876 |
| | | | 60 min after the intervention | Case | 67.57 ± 7.64 | 0.002 |
| | | | | Control | 77.23 ± 10.15 | 0.305 |
| | Control | 75.91 ± 10.09 | 90 min after the intervention | Case | 66.46 ± 6.90 | 0.000 |
| | | | | Control | 78.37 ± 10.54 | 0.022 |
| RR | Case | 21.97 ± 3.38 | Immediately after the intervention | Case | 20.06 ± 2.40 | 0.000 |
| | | | | Control | 21.31 ± 2.87 | 0.632 |
| | | | 60 min after the intervention | Case | 19.54 ± 2.12 | 0.000 |
| | | | | Control | 20.86 ± 2.58 | 0.416 |
| | Control | 21.17 ± 2.45 | 90 min after the intervention | Case | 19.66 ± 2.50 | 0.000 |
| | | | | Control | 21.00 ± 2.01 | 0.644 |

**Table 5**
Comparison of the mean changes in vital signs of participants before, immediately after, 60 min, and 90 min after the intervention in the case and control groups using the independent *t*-test.

| Variable | Group | Mean ± SD difference | P value |
|---|---|---|---|
| DBP 2-1 | Case | −2.26 ± 1.17 | 0.001 |
| | Control | −0.26 ± 0.50 | |
| DBP 3-1 | Case | −7.14 ± 8.07 | 0.000 |
| | Control | 1.42 ± 9.20 | |
| DBP 4-1 | Case | −7.00 ± 7.30 | 0.000 |
| | Control | 0.14 ± 6.12 | |
| SBP 2-1 | Case | −8.14 ± 8.07 | 0.006 |
| | Control | −0.57 ± 11.68 | |
| SBP 3-1 | Case | −7.57 ± 12.97 | 0.019 |
| | Control | −0.71 ± 10.85 | |
| SBP 4-1 | Case | −9.28 ± 8/59 | 0.001 |
| | Control | −1.00 ± 10.83 | |
| RR 2-1 | Case | −5.20 ± 7.41 | 0.004 |
| | Control | 0.20 ± 7.53 | |
| RR 3-1 | Case | −4.48 ± 8.07 | 0.003 |
| | Control | 1.31 ± 7.47 | |
| RR 4-1 | Case | −5.60 ± 7.47 | 0.003 |
| | Control | 2.46 ± 6.08 | |
| PR 2-1 | Case | −1.91 ± 2.06 | 0.000 |
| | Control | 0.14 ± 1.75 | |
| PR 3-1 | Case | −2.43 ± 2.53 | 0.000 |
| | Control | −0.31 ± 2.26 | |
| PR 4-1 | Case | −2.31 ± 2.70 | 0.001 |
| | Control | −0.17 ± 2.17 | |

2-1: Measurement immediately after the intervention compared with before the intervention.
3-1: Measurement 60 min after the intervention compared with before the intervention.
4-1: Measurement 90 min after the intervention compared with before the intervention.

Therapeutic touch and massage can reduce cortisol levels, which is an indicator of stress, and improve vital signs [17,18].

Different theories have been proposed about how massage affects anxiety, pain, and the vital signs of patients. It has been suggested that massage has an effect on the hypothalamus–pituitary axis, the sympathetic system, and epinephrine. For example, massage stimulates the parasympathetic system and decreases sympathetic activity to reduce the level of stress hormones and the balance of vital signs [7]. Massage is also related to the release of oxytocin, which improves relaxation [6,13]. Massage improves venous and lymphatic reversal in patients, affects sensory receptors, and increases endorphin levels, which are involved in pain relief. Massage can reduce anxiety by stimulating the parasympathetic system, reducing cortisol levels, and increasing the levels of serotonin and dopamine [33]. Massage also causes the release of peptides, which have analgesic effects, increases serotonin levels, and makes the patient feel comfortable [20]. According to patients, massage therapy can cause mental relaxation in addition to physical relaxation and pain relief [34]. Massage makes patients feel comfortable through physical induction and mental relaxation, an increased flow of blood, oxygen, and nutrients in tissues, stimulation of the parasympathetic system, increased endorphin secretion, decreased local inflammation, secretion of catecholamines, decreased muscle spasm, and closure of pain gates [35]. Massage improves the range of motion of joints and strengthens the immune system by increasing white blood cells, improving lymph drainage, and reducing edema in the tissue [36]; it also improves sleep quality [17].

However, some studies on massage reported different outcomes [19,35]. For example, Najafi et al. in contrast to our study, found that massage had no effect on anxiety or pain in patients with burn injuries. Their results may be due to the severe burns on the patients' hands and feet and the absence of stimulation in the patients' hands. Another reason might be the individual's ability to massage or the type of massage used [35]. Fakhr-Movahedi et al. reported that massage improved the SBP and RR, but did not affect DBP. The discrepancy in their results compared with our study may be due to the type of intervention and the difference in massage areas [24]. Kanitz et al. found that rhythmic massage did not affect the level of salivary cortisol; the reason could be attributed to the type of technique used [37].

In the present study, a simple, non-pharmacological, and low-cost method was investigated to determine its effect on anxiety and the vital signs of patients. The results showed that hand and foot massage reduced the level of anxiety and improved the vital signs.

## 5. Conclusion

According to the results obtained in this study, hand and foot surface stroke massage reduced the level of anxiety and improved vital signs. Because this intervention is convenient and has a low cost, it can be recruited as a complementary therapy to attenuate anxiety and improve vital signs.

### 5.1. Study limitations and problems

The main limitation of the present study was the small sample size. One of the problems in this study was the rejection of the intervention by some of the participants. Although explanations were provided so that participants understood the benefits and application of the massage in medicine, the research objectives and procedures, the confidentiality of information, some participants voluntarily chose not to participate in the research. Participants were also assured that a trained person would perform the massage.

### 5.2. Study strengths

The main strengths of the present study were the use of randomization to allocate participants to either the case or control groups, as well as the methods of data collection.

## 6. Recommendations

Future studies should be conducted with large sample sizes for a more accurate assessment of the effect of hand and foot surface stroke massage on patient outcomes.

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