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Effect of Back Massage Intervention on Anxiety, Comfort, and Physiologic Responses in Patients with Congestive Heart Failure

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Abstract

Background: Patients suffering from congestive heart failure (CHF) frequently feel physical suffering and anxiety.
Objectives: The researchers investigated whether back massage could reduce anxiety, discomfort, and physical suffering in patients with CHF. The effects of gender and severity-dependent response of back massage on anxiety and discomfort in patients were also analyzed.
Design: The study used a quasi-experimental design with one group pretest and posttest.
Participants: Sixty-four participants were recruited in southern Taiwan.
Outcome measures: The modified State Anxiety Inventory, the discomfort Visual Analogue Scale, electronic blood pressure (BP) gauges, stethoscopes and the pulse oximetry were used in this study.
Results: The participants' systolic BP (F (3, 189) = 18.91, $p < 0.01$), diastolic BP (F (3, 189) = 13.40, $p < 0.01$), heart rate (F (3, 189) = 26.28, $p < 0.01$), and respiratory rates (F (3, 189) = 5.77, $p < 0.01$) were significantly decreased after back massage. Oxygen saturation levels showed significant increases (F (3, 189) = 42.82, $p < 0.01$). Male participants revealed a more significant reduction in anxiety than the female participants (F (1, 50) = 7.27, $p = 0.01$). Those with more severe heart failure and greater levels of anxiety (F (2, 61) = 4.31, $p = 0.02$) and systolic BP (F (2, 61) = 3.86, $p = 0.03$) demonstrated significantly greater responses to back massage.
Conclusions: Back massage significantly reduced anxiety in the study population. Systolic BP decreased to a greater degree in the male participants, particularly in those with severe heart failure and greater levels of anxiety and higher systolic BP. This study was conducted without a control group. Randomized clinical trials are needed to validate the effectiveness of back massage on patients with CHF.

Introduction

Congestive heart failure (CHF) is the inability of the myocardium to pump enough blood to meet the body's metabolic demands.[1] The most common causes of CHF are hypertension and coronary artery disease.[2] CHF is characterized by several complex symptoms that are difficult to control and result in a high prevalence of rehospitalization, morbidity, and mortality across the world. Common physical symptoms of CHF are tachycardia, shortness of breath, decrease in arterial blood oxygenation (Pao_2), discomfort, and disordered sleeping patterns.[3] Patients with CHF feel uncertain, anxious, and depressed.[4] Negative emotions (i.e., anxiety and depression) appear to be more common in patients with CHF than in healthy individuals.[5] A study showed that female patients felt anxious and powerless in respect to their illness.[6] Women expressed significantly greater levels of anxiety and depression than men did.[7] Jiang et al.[8] interviewed 291 patients with CHF and found that the younger the patient, the greater the anxiety. However, anxiety was not

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significantly associated with baseline left ventricular ejection fraction and New York Heart Association functional classification (NYHA). Elderly patients with heart failure had higher levels of anxiety than the healthy elderly.[7] The patients with an educational level of only high school or less reported significantly higher levels of anxiety than those with a college education.[7]

Massage is a systematic form of touch that manipulates soft tissues of the body to promote comfort and healing.[9] Massage therapy might have minor adverse effects,[10] such as bruising, headache, and fatigue,[10,11] but rarely serious adverse effects (i.e., cerebrovascular accidents or hematomas). The majority of adverse effects were associated with exotic types of manual massage or massage delivered by laypersons.[12] Studies have shown that massage can reduce pain, BP, heart rate, cortisol, and promote sleep and immune function.[9,13,14] Patients who had cancer and who received a back massage had better moods and lower levels of perceived stress than those who did not.[14] Back massage appeared to reduce diastolic BP, respiration, perceived psychologic distress, and pain in the preparatory time for cardiac catheterization.[15] However, a randomized clinical study demonstrated that 30-minute massage therapy sessions after cardiac surgery did not improve psychometrics (e.g., anxiety and depression) or physical condition (e.g., heart rate and BP).[16] While there have been multiple studies examining the effects of massage on the treatment of various medical conditions, there has been no research done to investigate whether back massage reduces anxiety and improves physiologic response in patients with CHF. The aims of this study were to investigate whether back massage could alleviate anxiety and discomfort, and improve physiologic indicators in patients with CHF (BP, heart beat, breathing rate, oxygen saturation) and whether gender and the severity of CHF influenced the effectiveness of back massage.

Materials and Methods

Participants

This study was a quasi-experimental, one group pretest and post-test design with repeated measures (without a control group). It was conducted on two cardiac wards in a medical center in southern Taiwan. Subjects were recruited using convenience sampling. The participants were diagnosed with NYHA Class II–IV heart failure by a cardiac specialist. The participants with potential confounders, such as a thrombosis greater than 1 cm by the Doppler echography, back-pressure ulcers, acute pulmonary edema, respiratory failure, or cardiac tamponade, were excluded. Sixty-four (64) participants met the eligibility criteria. The outcome indicators were measured before the first back massage. These indicators served as the control condition, and were treated as pre-intervention findings to be compared with the postintervention findings.

Procedures

This study was approved by the Institutional Review Broad of the medical center, and an informed consent was obtained before data collection. The standard massage procedure was guided by an assistant professor of physical therapy. Participants were recruited to participate in this study within 24 hours after admission to the cardiac ward. The back massages were begun 3 days after hospitalization in order not to disturb their medical treatment plan.

Protocols for back massage varied in previous studies.[17] The intensity and duration of massage ranged from one session of 3–45 minutes to 15 sessions over 4 weeks.[18–20] To be consistent with the research aim to reduce anxiety and improve physical indicators, after this pilot study, the protocol of back massage was standardized for 10 minutes. Back massage (from sacral area through to cervical area) was delivered 10 minutes each day for 3 days consecutively. Back massage intervention included pressing and stroking (effleurage), kneading (petrissage), rubbing with short strokes, tapping (percussion), and rubbing with long strokes (friction). Back massage was arranged one hour before a meal or two hours after a meal. Before the massage, each participant was asked to sit up and position himself/herself on a bedside table with a pillow to cushion. Curtains were drawn to ensure the participants' privacy. Blood pressure, heart rate, respiratory rate, and blood oxygen saturation data were collected 30 minutes before and after back massage.

Measure

The Chinese version of the modified State Anxiety Inventory (modified SAI) was used to measure anxiety. Zhong and Long[21] created this version, based on that devised by Spielberger et al.[22] with 20 items. The most important descriptions were of feelings at a given moment to determine anxiety levels caused by external pressures. The modified SAI used a 4-point Likert scale. The maximum score was 80 points, and the minimum 20; the higher the score, the higher the anxiety. The original version of the SAI had Cronbach α of approximately 0.83–0.92.[21] The Cronbach α for the Chinese version of the modified SAI was 0.90, and test–retest reliability was 0.74.[21] The Cronbach α for the Chinese version of the modified SAI was 0.89 in this study.

The Discomfort-Visual Analogue Scale (Discomfort-VAS) was used to assess each patient's discomfort levels. The Discomfort-VAS is a straight, 10-cm line with no discomfort whatsoever at the bottom, and the most serious discomfort at the top. It is primarily concerned with patients' subjective feelings.[23] The participants' perceived discomfort is logged as his/her current condition. VAS is easy to understand and use. Straker[24] showed that VAS was more sensitive to discomfort than to pain.

An Omron MX3 arm-applied BP gauge (Omron Healthcare, Singapore) was used to measure BP. This device was approved by the Bureau of Standards, Metrology and Inspection. Its measurement limit was set at 0–280 mm Hg, with a margin of error of ± 3 mm Hg. The BP was taken on the brachial artery, on the antecubital crease, level with the heart, with the pressure gauge at the bottom of the device, about 2.5 cm from the first crease of the elbow.

The pulse oximetry used to measure oxygen saturation (O_2 Sat) in the digital finger was made by Koike Medical Co., Kanagawa, Japan. Its measurement limits were set at 0–99%, with a margin of error of $\pm 2\%$.

A Littmann stethoscope (3M, Minnesota) was used to measure heart rate (HR). Its membrane was placed on the subject's middle left clavicle line, between the fourth and fifth ribs, to measure the apical heartbeat for a minute.

Breathing rate was measured by observing the expansion and contraction of the subject's chest for 1 minute.

Using the four-Class system of CHF defined by the NYHA in the United States, disease severity was estimated based on the reduction of cardiac output and functional activity.[25] NYHA Class Symptoms for Class I are: no symptoms and no limitation in ordinary physical activity. Class II indicates mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity. Class III indicates marked limitation in activity due to symptoms, even during less-than-ordinary activity (e.g., walking short distances (20–100 m), and being comfortable only at rest. Class IV indicates severe limitations in which a patient experiences symptoms even while at rest; this comprises mostly bedbound patients.[25] A senior cardiologist was invited to assess the participants based on the class system.

In addition, a semi-opened structured question was used to interview participants. After the back massage, participants were invited to describe their perceptions while receiving back massage.

Data analysis

Back massage effects on anxiety, discomfort intensity, HR, respiratory rate, BP, and Pao_2 were examined across time with the paired *t*-test, separately, comparing each value of the postintervention measures with the value of pre-intervention measures. A repeated-measures analysis of variance was used to capture the effects of patterns on outcome measures. The interview data from semistructured questions were analyzed into categorical data and presented as frequency and percentage by 1 researcher. The invited associated professor reviewed the analyzed process.

Results

Characteristics of participants

A total of 64 individuals participated in this study. The proportion of male and female participants was 31/33, with a mean age of 67.14 (standard deviation = 10.82). In terms of educational level, the participants who were unable to read or write comprised the largest group (45.31%, $n = 29$). With regard to the particular features of their conditions, the largest group (43.75%, $n = 28$) had been diagnosed with CHF less than 6 months earlier; most participants (70.31%) were NYHA class III (marked limitation of physical activity, only comfortable at rest); and the largest group comprised subjects with hypertension (64.06 %, $n = 41$).

Outcomes

As shown in Table 1, after back massage, participants had significantly reduced anxiety (F (3, 189) = 74.29, $p < 0.01$) and discomfort (F (3, 189) = 59.85, $p < 0.01$) compared to pre-massage. After 3 days of back massage, participants' systolic BP (F (3, 189) = 18.91, $p < 0.01$), diastolic BP (F (3, 189) = 13.40, $p < 0.01$), HR (F (3, 189) = 26.28, $p < 0.01$), and respiratory rates (F (3, 189) = 5.77, $p < 0.01$) were significantly decreased. Also, the participants' oxygen saturation levels showed significant improvement (F (3, 189) = 42.82, $p < 0.01$).

Comparisons were made among changes in outcome indicators (anxiety, discomfort, systolic BP, diastolic BP, pulse, respiration, and oxygen saturation) in relation to demographic characteristics (age, gender, educational level, length of illness, and NYHA class for CHF). The changes of outcome indicators were presented as mean differences that were calculated by the mean of post-test III (after intervention on Day 3) minus the mean of pre-intervention (on Day 1). The mean differences with normal distribution were analyzed by parametric statistical analysis, and those means without normal distribution were analyzed by nonparametric analysis.

There were two age groups: 45–64, and 65–80. The changes of outcome indicators showed no significant differences between these two groups (Table 2). However, there was a significant difference between gender with regard to changes in anxiety level (F (1, 50) = 7.27, $p = 0.01$). The changes in anxiety after the massages among males were significantly

Table 1. Changes in Anxiety, Discomfort, and Physiologic Indicators After Intervention ($N = 64$)

Variables	① *Pre-intervention* *Mean (SD)*	② *Day 1* *Mean (SD)*	③ *Day 2* *Mean (SD)*	④ *Day 3* *Mean (SD)*	F[a]	*LSD test*
Anxiety	43.69 (10.18)	40.31 (7.69)	37.86 (6.98)	33.66 (5.69)	74.29*	②,③,④<① ③,④<② ④<③
Discomfort	52.19 (23.53)	43.08 (21.62)	39.53 (22.26)	31.41 (18.37)	59.85*	②,③,④<① ④<②,③ ④<③
Systolic BP (mm Hg)	136.53 (18.85)	130.53 (19.19)	126.55 (16.65)	124.95 (16.98)	18.91*	②,③,④<① ③,④<②
Diastolic BP (mm Hg)	80.95 (10.66)	76.78 (10.60)	75.17 (9.87)	73.86 (9.54)	13.40*	②,③,④<①
Heart rates (times/min)	94.19 (16.16)	90.05 (13.66)	86.98 (12.34)	86.16 (12.19)	26.28*	②,③,④<① ③,④<②
Respiration (times/min)	22.56 (4.21)	21.30 (3.38)	21.63 (3.92)	21.09 (3.65)	5.77*	②,④<①
Oxygen saturation (%)	93.66 (3.13)	94.39 (2.95)	94.84 (3.43)	95.36 (3.12)	42.82*	③,④>① ④>②,③

*$p < 0.01$.
[a]F, *F* value analyzed by using repeated measures.
SD, standard deviation; LSD, least significant difference; BP, blood pressure.

Table 2. Comparisons of Mean Differences in Pre- and Postintervention Between Different Ages ($N=64$)

Variables	45–64 years old M^a (SD) (n=22)	65–80 years old M^a (SD) (n=42)	F^b/Z^c	p
Anxiety	−12.14 (8.20)	− 8.93 (7.04)	2.14[b]	0.15
Discomfort	−20.77 (16.28)	−20.76 (14.53)	2.27[b]	0.14
Systolic BP (mm Hg)	−6.59 (12.66)	−14.19 (16.46)	0.62[b]	0.44
Diastolic BP (mm Hg)	−5.50 (8.59)	−7.93 (11.18)	0.26[b]	0.61
Pulse (times/min)	−8.14 (11.14)	−7.98 (9.06)	0.39[b]	0.53
Respiration rate (times/min)	−0.91 (4.14)	−1.76 (3.77)	2.78[b]	0.10
Oxygen saturation (%)	2.14 (1.58)	1.48 (1.48)	−1.75[c]	0.08

[a]M, mean (post-test III) – mean (pretest).
[b]F, F value analyzed by using multivariate analysis of variance.
[c]Z, Z value analyzed by using Mann-Whitney U test.
SD, standard deviation; BP, blood pressure.

greater than those among females ($p=0.01$) (Table 3). There was an insignificant difference between males and females in relation to changes in the other outcome indicators. There were 2 groups for educational level: graduates of elementary school or below, and graduates of junior high school or above. The results showed insignificant difference in changes of outcome indicators between the 2 groups of educational status (Table 4). Length of illness was classified into two levels: 2 years or less, and more than 2 years. Changes in outcome indicators showed insignificant difference for the length of illness (Table 5). In relation to the NYHA Class for CHF, changes in anxiety level ($F_{(2,\ 61)}=4.31$, $p=0.02$) and systolic BP ($F_{(2,\ 61)}=3.86$, $p=0.03$) showed significant differences, but changes in the other outcome indicators showed no significant difference (Table 6). To detail the changes in relation to NYHA Class, for 10 NYHA Class II participants, the changes of anxiety level ranged from 40.0±7.51 (pre-intervention) to 32.10±3.18 (postintervention). For 45 NYHA Class III participants, the changes of anxiety level ranged from 43.24±10.12 (pre-intervention) to 34.02±6.25 (postintervention). For 9 NYHA Class IV participants, the changes of anxiety level ranged from 50.0±11.23 (pre-intervention) to 33.56±5.03 (postintervention). The changes of systolic BP for Class II participants ranged from 128.60±13.99 mm Hg (pre-intervention) to 125.10±19.19 mm Hg (postintervention). For NYHA Class III participants, changes ranged from 135.89±17.28 mm Hg (pre-intervention) to 124.69±16.34 mm Hg (postintervention). For NYHA Class IV participants, changes ranged from 148.56±26.29 mm Hg (pre-intervention) to 126.11±19.66 mm Hg (postintervention).

Discussion

In this study, systolic BP and diastolic BP both significantly declined after massage. Two (2) days after massage, systolic BP had significantly declined in this study. After 1 day of massage, diastolic BP also declined significantly, and did so again on the following 2 days. Following massage, HRs also declined significantly. The study showed that the cardiopulmonary distress declined significantly after the first day of massage, and this happened again after the second and third days of massage. This finding was similar to those reported in previous studies in other diseases.[26,27] In the literature review, it was found that of all the physiologic indicators of the effect of massage, HR was the strongest indicator of relaxation. Breathing rates also declined significantly.[9] After the massages, respiratory rates showed significant decline on day 1 and day 3, but not on day 2. Further study would be needed to verify the relationship between changes in respiratory rate and frequency of massage. Labyak and Metzger,[26] after using meta-analysis on 9 back

Table 3. Comparisons of Mean Differences Between Pre- and Postintervention by Gender ($N=64$)

Variables	Male M^a (SD) (n=31)	Female M^a (SD) (n=33)	F^b/Z^c	p
Anxiety	−11.16 (8.92)	−8.97 (5.94)	7.27[b]	0.01*
Discomfort	−22.90 (13.48)	−18.76 (16.29)	2.61[b]	0.11
Systolic BP (mm Hg)	−8.68 (14.41)	−14.30 (16.37)	1.33[b]	0.25
Diastolic BP (mm Hg)	−6.52 (9.38)	−7.64 (11.31)	0.56[b]	0.46
Heart rate (times/min)	−7.87 (10.85)	−8.18 (8.73)	0.09[b]	0.77
Respiration rate (times/min)	−1.58 (3.85)	−1.36 (3.98)	−1.05[c]	0.30
Oxygen saturation (%)	1.65 (1.70)	1.76 (1.39)	−0.01[c]	0.99

*$p<0.05$.
[a]M, mean difference = mean (post-test III) – mean (pretest).
[b]F, F value analyzed by using multivariate analysis of variance.
[c]Z, Z value analyzed by using Mann-Whitney U test.
SD, standard deviation; BP, blood pressure.

Table 4. Comparisons of Mean Differences in Pre- and Postintervention Between Different Educational Levels ($n=64$)

Variables	*1*[a] *M*[b] *(SD)* (n=*45*)	*2*[a] *M*[b] *(SD)* (n=*19*)	F[c]/Z[d]	p
Anxiety	−9.02 (7.28)	−12.42 (7.84)	1.77[c]	0.19
Discomfort	−20.36 (14.56)	−21.74 (16.45)	1.50[c]	0.23
Systolic BP (mm Hg)	−12.58 (16.23)	−9.21 (14.07)	0.21[c]	0.65
Diastolic BP (mm Hg)	−7.42 (10.54)	−6.32 (10.14)	0.98[c]	0.33
Pulse (times/min)	−7.31(9.46)	−9.74 (10.41)	0.56[c]	0.46
Respiration rate (times/min)	−1.31 (3.93)	−1.84 (3.88)	3.58[c]	0.06
Oxygen saturation (%)	1.56 (1.41)	2.05 (1.81)	−1.62[d]	0.11

[a]1, indicates graduated from elementary or below; 2, graduated from junior high school or above.
[b]M, mean difference = mean (post-test III) – mean (pretest).
[c]F, *F* value analyzed by using multivariate analysis of variance.
[d]Z, *Z* value analyzed by using Mann-Whitney *U* test.
SD, standard deviation; BP, blood pressure.

massage patients, found that the patients' breathing frequency declined by 6.4% after the massages. After participating in massage for 2 days, participants' blood oxygen saturation levels had significantly increased compared to pre-intervention in this study. Back massage can also improve pulmonary function and promote circulation when the amount of blood in the pulmonary artery increases. The increased amount of blood has more opportunity to exchange gases, enabling more oxygen supply throughout the body and raising the oxygen saturation level.[28,29]

Overall, this study demonstrated the feasibility of implementing a back massage program, and the acceptability and perceptions of benefit in patients with CHF. However, some research investigated the time effects of back massage on mean arterial pressure and HR, but showed no statistically significant results.[19] Breathing rate had no significant change.[30] Albert et al.[16] found no marked change in anxiety levels. Outcomes of physiological indicators showed disparities. The reasons for these disparities include dose, length, frequency and type of massage, amount of pressure applied by the massage therapist, participants' age, body shape, disease progression, and measurement methods. Moser et al.[7] reported that patients' anxiety levels were correlated with their gender, age, and educational level. In the current study, the male participants showed a significantly greater reduction in anxiety than the female participants. Majani et al.[31] reported that patients with different NYHA class of CHF experienced different anxiety levels. In the current study, the participants of different NYHA classes presented significantly different levels of anxiety reduction and systolic BP after back massage. Grady et al.[32] proposed that systolic BP should be kept above or around 80 mm Hg and below 130–139 mm Hg, in order to meet the need of physical activity for the patients. After back massage, the participants' systolic BP had decreased significantly and maintained within the normal range to prevent CHF symptoms.

The modified SAI was used to measure anxiety. The patients described perceptions from back massage as follows: "relaxed," "comfortable," "glad," "joyful," "at ease," after the back massage. Fifteen (15) participants (22.1%) described their perceptions as very comfortable, muscle relaxation, and very sleepy. Four (4) participants (5.9%) were asleep right after back massage. Ten (10) participants (14.7%) reported that they slept more hours after the back massage. Thus, back massage could actually reduce stress, relax muscles, and improve sleep duration.[13] Normal sleep could reduce the physiologic burden on the cardiovascular system.[33]

Table 5. Comparisons of Mean Differences in Pre- and Postintervention Between the Different Lengths of Illness ($n=64$)

Variables	*≤2 years* *M*[a] *(SD)* (n=45)	*>2 years* *M*[a] *(SD)* (n=19)	F[b]/Z[c]	p
Anxiety	−10.67 (7.14)	−8.53 (8.47)	2.32[b]	0.13
Discomfort	−19.22 (13.10)	−24.42 (18.73)	2.81[b]	0.10
Systolic BP (mm Hg)	−10.11 (15.69)	−15.05 (15.19)	0.77[b]	0.38
Diastolic BP (mm Hg)	−6.67 (9.50)	−8.11 (12.38)	0.76[b]	0.39
Pulse (times/min)	−8.20 (9.54)	−7.63 (10.44)	0.53[b]	0.47
Respiration (times/min)	−1.36 (3.23)	−1.74 (5.24)	0.75[b]	0.39
O_2 saturation (%)	1.76 (1.48)	1.58 (1.71)	−0.28[c]	0.78

[a]M, Mean difference = mean (post-test III) – mean (pretest).
[b]F, *F* value analyzed by using multivariate analysis of variance.
[c]Z, *Z* value analyzed by using Mann-Whitney *U* test.
SD, standard deviation; BP, blood pressure.

Table 6. Comparison of Mean Differences in Pre- and Postintervention Among the NYHA Grades for Patients with CHF ($N=64$)

Variables	*NYHA II* M^a *(SD)* (n=*10*)	*NYHA III* M^a *(SD)* (n=*45*)	*NYHA IV* M^a *(SD)* (n=*9*)	F[b]	p	*Tukey's HSD*
Anxiety	−7.90 (5.59)	−9.22 (6.61)	−16.44 (10.90)	4.31	0.02*	①>③ ②>③
Discomfort	−18.60 (15.28)	−20.27 (15.01)	−25.67 (15.55)	0.60	0.55	
Systolic BP (mm Hg)	−3.50 (16.55)	−11.20 (14.78)	−22.44 (13.74)	3.86	0.03*	①>③
Diastolic BP (mm Hg)	−3.30 (10.27)	−7.00 (10.30)	−11.78 (9.95)	1.63	0.21	
Pulse (times/min)	−11.40 (7.17)	−7.38 (10.46)	−7.56 (8.38)	0.70	0.50	
Respiration rate (times /min)	−2.00 (5.21)	−1.53 (3.44)	−0.56 (4.75)	0.34	0.71	
Oxygen saturation (%)	1.70 (1.34)	1.53 (1.59)	2.56 (1.33)	1.69	0.19	

*$p<0.05$.
[a]M, mean difference = mean (post-test III) – mean (pretest).
[b]F, *F* value analyzed by using analysis of variance.
NYHA grades for CHF, according to the grade suggested by American New York Heart Association for congestive heart failure.
SD, standard deviation; HSD, honestly significant difference; BP, blood pressure.

Participants reported that back massage by stroking, kneading, and pressing significantly reduced anxiety and tension, and improved relaxation. These results were consistent with previous research findings in other diseases.[34]

Limitations of the study

There are three limitations of this study: (1) The same researcher performed the back massage and collected the data, so there is a risk of the experimenter effect; (2) A quasi-experimental design with pre-test and post-test was adopted, without a control group; and (3) The CHF patients that are admitted to a medical center in southern Taiwan tend to be seriously ill. The participants were hospitalized patients whose medications had mostly had an ameliorating effect already and whose BP had mostly been controlled within stable limits (in order to avoid high BP, which can double the seriousness of CHF). Therefore, the results of this study probably should not be applied to all of the hospitalized CHF patients, but only to male patients with severe CHF.

Conclusions

Back massage can help CHF patients be less anxious and more comfortable. After back massage for 3 consecutive days, the participants' systolic and diastolic BP, HRs, and breathing rates were significantly lower than before, while their oxygen saturation levels significantly increased. After 1 day of massage, anxiety and discomfort levels, systolic BP, diastolic BP, HRs, and respiratory rates significantly improved. Oxygen saturation levels significantly increased after 2 days of back massage. The changes in anxiety level after massage among male participants, and participants with severe CHF, were significantly greater than those among female participants.

This study was conducted without a control group. There is a need to conduct a randomized clinical trial to explore the effects of massage frequency on anxiety, comfort, diastolic BP, and respiration before a general application in all CHF patients. The conclusion that back massage can be more helpful to male patients than female patients needs to be confirmed in an additional study with a large randomized sample size.

In clinical practice, back massage is an effective and comfortable nursing intervention.[35] It enables nurses to perform their own distinct functions and increases their sense of achievement. Thus, these findings support the integration of massage into routine care. The massage intervention provided good results for CHF patients in this study. Nursing currently emphasizes caring and humanity and, in that light, the back massage protocol and the results of this study might be used to improve nursing education. It can be promoted in clinical practice, and carried out as part of nursing continuous education so as to enhance nursing quality and patient comfort.

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Disclosure Statement

No competing financial interests exist.

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