

*Original Article***The effect of massage therapy on blood pressure of women with pre-hypertension***Mahin Moeini **, *Mahshid Givi ***,*Zahra Ghasempour ****, *Masoumeh Sadeghi *******Abstract**

BACKGROUND: Prehypertension is considered as a cardiovascular disease predictor. Management of prehypertension is an appropriate objective for clinicians in a wide range of medical centers. Treatment of prehypertension is primarily non-pharmacological, one of which is massage therapy that is used to control the blood pressure. This study aimed to evaluate the effect of Swedish massage (face, neck, shoulders and chest) on blood pressure (BP) of the women with prehypertension.

METHODS: This was a single-blind clinical trial study. Fifty prehypertensive women selected by simple random sampling which divided into control and test groups. The test group (25 patients) received Swedish massage 10-15 min, three times a week for 10 sessions and the control groups (25 patients) also were relaxed at the same environment with receiving no massage. Their BP was measured before and after each session. Analyzing the data was done using descriptive and inferential statistical methods (chi square, Mann-Whitney, paired t-test and student t-test) through SPSS software.

RESULTS: The results indicated that mean systolic and diastolic blood pressure in the massage group was significantly lower in comparison with the control group ($p < 0.001$).

CONCLUSIONS: Findings of the study indicated that massage therapy was a safe, effective, applicable and cost-effective intervention in controlling BP of the prehypertension women and it can be used in the health care centers and even at home.

KEY WORDS: Massage therapy, prehypertension, women.

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Cardiovascular diseases are known as the first cause of mortality in the developed countries and it is growing rapidly in the developing countries too.¹ One of the major causes of increase of this disease in the world is the prevalence of hypertension^{2,3} which is considered as an important issue in public health and the risk of death all over the world.^{4,5} High blood pressure often has no symptom and many people are unaware of its outbreak. Most of the people would realize its outbreak when they experience heart attack or stroke and/or diagnosis in a physical examination.⁶ Today, in developed countries, 1 in every 3 adults has

hypertension,^{7,8} while approximately 50 million of the adults (18 years old or more) in the United States are suffering from hypertension.^{9,10} According to the statistics, one fifth of Iranian people (18.6%) over 15 year-old are suffering from this disease which is a high figure.¹¹ The prevalence of hypertension in studies of other countries¹ was higher in men but in the studied researches in Iran, it was higher in women.¹² Various studies indicated that prevalence of hypertension in the urban communities was higher than that of rural communities based on factors such as lifestyle, diet, environmental stresses and etc.¹³

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Prevalence of hypertension in Isfahan also has a high percentage and is unexpected.¹⁴ Obtained statistics in Isfahan in 1997 indicated that prevalence of hypertension among the urban women was more than that in rural women and even urban men.¹⁵

National Association of Iranian Students quoted from Biores from Blood Pressure Association stated that BP is like a ticking bomb and it should be treated seriously. He believed this is a preventable disease.¹⁶ Although the prevalence of hypertension would increase by age increase,³ recent studies showed that this was not a definite biological process and it can be prevented or postponed through some certain measures.¹⁷

Public Health Institute of America in the 7th report of Joint National Institute attracted the attention of health staff to two changes; first, therapeutic objective should be focused on systolic blood pressure not diastolic BP and second, developing a new classification of blood pressure range in which *prehypertensive group* should be added to.¹⁸ The second change was implemented following the effect of prehypertension and also drawing more attention to the healthy population and emphasis on prevention. Previous terms such as "high-normal" which was used in this BP range was not so applicable for the health staff, but they focused on the medical treatment with the new classifications.¹⁹

If someone undergoes two separate BP control, each control at least two times, and average BP is lower than $140/90$ and higher than $120/80$, he/she would be placed in prehypertension group. Vasan et al (2001) with a 10-year follow-up of the prehypertensive people and comparison of them with people with normal BP announced that the risk of cardiovascular disease in women and men with prehypertension was 2.5 and 1.6 times more than normal people, respectively.²⁰ Furthermore, Qureshi et al (2005) found that prehypertensive people are 3.5 times at the risk of myocardial infarction and 1.7 times at the risk of coronary disease.²¹

Russel et al also (2004) in a study titled "effect of prehypertension on admission and death" stated that clients with prehypertension allocated 3.4% of the admissions, 6.2% of home nursing care and 8.5% of the deaths.¹⁸ Osborn et al (2010) stated that these people are two times more at the risk of hypertension than people with normal BP.²²

Svetkey (2005) believed that clients with hypertension nearly in 19 percent of the cases, at the four subsequent years, would suffer from hypertension with clinical symptoms and this progression depends upon their BP levels. If these people suffer from blood pressure with high prehypertension level (systolic = 130-139 and diastolic = 85-89 mm Hg) 43% and if suffer from blood pressure with low prehypertension level (systolic = 120-129 and diastolic = 80-84 mm Hg), 20% of them will be placed in the hypertension group at the next 4 years.¹⁹ Kaplan (2009) also pointed out the necessity of follow-up of the people with borderline hypertension that according to the information of the 3rd Summit of National Health and Nutrition, prehypertensive people and also those with microalbuminuria are at the risk of early death following cardiovascular diseases.²³

Parikh (2008) believed those who are diagnosed as prehypertension must be the focus of treatment goals to prevent or delay the hypertension spread blast.²⁴

Julius et al (2006) in their studies suggested pharmacological methods for treating prehypertension.²⁵ Whereas many researchers with criticizing the researchers who use pharmacological therapy to treat them stated that focusing on the lifestyle and using non-pharmacological methods are the first-line treatment of the hypertensive people.^{2,26}

It also should be noted that although pharmacological treatment can be effective on the BP control, they have certainly some side effect.^{3,9}

Hernandez et al believed that using non-pharmacological treatments not only can immune the patients from the side effects of pharmacological methods, also is very cost-

effective.³ On the other hand, the majority of the physicians recommend changing the lifestyle and non-pharmacological treatments before prescription of the medications in the blood pressure control.^{6,27}

One of the non-pharmacological and lifestyle-based treatments is the complementary medicine.²² Olney (2005) suggested the complementary medicine in order to reduce stress and control the blood pressure.¹⁰ In addition, Osborn et al stated that probably using complementary medicine is effective on reduction of blood pressure and its application is easy, available and more cost-effective than medications.²²

Some of the complementary medicine techniques are at the nursing job range.^{8, 28} In 1997, Americans spent \$27 billion to use complementary medicine so that today due to increase of people's interest to use some of these techniques particularly massage therapy, this medicine took under the insurance and part of care plans in the hospitals and even it was included in a part of skill and educational curriculum of the physicians and nurses.^{8, 29-32}

According to the studies researches, massage therapy is the most popular among the patients and more researches for exploring its effects is continuing.³³ However, many of the results of the comparative articles indicated that nurses are more competent in control and management of the blood pressure than other health staff team. For example, McClellan and Craxton (1985) in a study on comparative evaluation of control and management of blood pressure by the nurses and physicians found that nurses had more capabilities in follow-up and management of the hypertensive patients.³⁴

The available studies on massage and blood pressure usually have different and sometimes contradictory results; some of the researchers believed massage is effective on reduction of the systolic and diastolic blood pressure, some others stated that its effect depends upon some certain conditions such as BMI or certain types of massage in certain areas, and some believed

massage is effective on systolic blood pressure and its effect on diastolic blood pressure needs applying massage in a long term period. Whereas a number of researchers found that massage was effective on diastolic blood pressure and was not effective on systolic blood pressure, some others believed massage therapy was effective on none of the systolic and diastolic blood pressures. The interesting point is that none of the above mentioned researchers evaluated the effect of this technique particularly in the prehypertensive clients. The researchers in the present study, according to focus on the slogan of "prevention prior to treatment" and also pointing the crucial role of nurses in realization of the mentioned slogan, tried to follow the following objectives:

1. To compare and determine mean systolic and diastolic BP in the test and control groups before the intervention in women with prehypertension who referred to Sedighe Tahereh Cardiovascular Center in 2010.
2. To compare and determine systolic and diastolic BP in the test group before and after the intervention.
3. To compare and determine systolic and diastolic BP in the control group before and after the intervention period.
4. To compare and determine systolic and diastolic BP in the test and control groups after the intervention.

Applicable Objective

Providing non-pharmacological suggestion and strategy based on findings to prevent from hypertension in women with prehypertension through nursing intervention and massage therapy.

Methods

This was a two-group two-phase single-blind clinical trial study which was done with massage therapy intervention (independent variable) on blood pressure changes (dependent variable). The study population included adult non-pregnant women (18-60 years) referred to

Sedighe Tahereh Cardiovascular Center who were at the prehypertensive phase and had inclusion criteria. The inclusion criteria were two separate blood pressure measurements, each time at least 2 times, with the average BP of less than $140/90$ and more than $120/80$ mmHg, lack of diseases affecting the blood pressure, lack of skin disease in the massage area, lack of taking medication affecting the blood pressure, no specific diet, no obesity, no severe or acute stress and lack of using relaxing techniques. After obtaining the written informed consent, all the subjects filled in the demographic data forms. The study subjects of control group were ensured that provided with effectiveness of the intervention and their willingness, massage therapy would also be done on them. They were asked not to change their lifestyle during the study and continue their daily and routine habits, work out and diet. The effective variable on BP were controlled as much as possible; however individual differences, incidents and daily stress and also the way individuals adapted themselves with life affairs were the uncontrollable variables of the study.

The samples were selected by the simple sampling method. Therefore, they randomly divided into test and control groups. To do so, some cards written by *control* and *test* on were put in a box and they were asked to pick one, and consequently, the subjects with control cards and test cards were placed into the control and intervention groups, respectively. In the present study, by massage therapy we meant Swedish massage which was conducted using non-aromatic topical lotion on face, neck, shoulders and upper chest using superficial and deep stroking, three times a week (morning to noon, 8 to 12 A.M.) each 10-15 minutes for ten sessions for 3.5 weeks in the supine state. One of the researchers sat near the sample and her hand was parallel to the heart; she measured and recorded the blood pressure of the client from the right hand before and after each intervention in each session. The control

group had all the criteria of the test group except receiving massage. They, during the massage therapy of the test group, lied down on the bed with the arbitrary condition, with deep breath, eyes closed and relaxation of the muscle. In addition, to assess durability of the intervention effect, 72 hours after the study, all the study samples were called again to check their blood pressure for the last time. The data of the present study were collected through discussion, case studies and blood pressure measurements. A Richter sphygmomanometer and a standard Littmann® stethoscope which their reliability and validity had been confirmed and calibrated at the beginning and middle of the study were used by the researcher who was unaware of the samples' group (test or control). Measurement was done with respect to the American Heart Association suggested tips to accurately measure the blood pressures. Furthermore, demographic data of the samples such as age, educational level, occupation, marital status and also, menstrual status and their height and weight were recorded. In order to estimate BMI, a unit of weight and a unit of meter were used; their reliability and validity had been confirmed and were similar for all the samples. In order to achieve study results, collected data were encoded and analyzed by SPSS software version 16. To do so, descriptive and inferential statistics methods were used. The obtained data were evaluated through descriptive statistics such as frequency, mean and standard deviation and also, inferential statistics such as chi square, Mann-Whitney, Fisher's exact test, paired t-test and independent t-test.

Results

Reviewing the obtained results in the two groups indicated that there was no significant difference in terms of demographic data, menstrual status and BMI between the two groups ($p > 0.05$).

The objective-based results are shown in the following tables:

Table 1. Comparing the average systolic blood pressure before and after the intervention in the test and control groups

Mean systolic BP	Test	Control	Independent t
Before intervention of the first session	128 (6.7)	129.04 (6.36)	0.170 p = 0.86
After intervention of the last session	116.00 (9.14)	130.00 (7.50)	5.91 p < 0.001
Paired t	7.6 p < 0.001	1.1 p = 0.278	-

Table 2. Comparing the average diastolic blood pressure before and after the intervention in the test and control groups

Mean diastolic BP	Test	Control	Independent t
Before intervention of the first session	81.68 (2.5)	81.52 (61.85)	0.812 p = 0.79
After intervention of the last session	76.32 (3.77)	81.36 (2.13)	5.81 p < 0.001
Paired t	7.4 p < 0.001	0.44 p = 0.664	-

As it is indicated from the above tables, in association with the first objective, the two groups had no significant difference in terms of mean systolic and diastolic BP before the intervention ($p > 0.05$).

In association with the second objective, mean systolic and diastolic BP in the test group had a significant difference before and after the intervention ($p < 0.001$).

In association with the third objective, mean systolic and diastolic BP in the control group had no significant difference before and after the intervention period ($p > 0.05$).

In association with the fourth objective, mean systolic and diastolic BP had a significant difference after the intervention in the both groups ($p < 0.001$).

Discussion

It should be noted that due to dividing the samples into test and control groups randomly, blood pressure of both groups before the intervention either were similar or with the help of statistical tests such as covariance, we could control this heterogeneity between the study groups.

For example, in the study of Moke and Woo (2004), there was no significant difference before conducting the study between the groups in terms of mean systolic and diastolic blood pressures (systolic, $p = 0.139$ and diastolic,

$p = 0.055$).³⁵ But, in the study of Olney (2007) there was a significant difference between the two groups in terms of mean systolic and diastolic blood pressures ($p < 0.05$); they controlled this difference through statistical covariance test.³¹

In association with the second objective of the study, paired t-test showed that the average systolic and diastolic blood pressure with $p < 0.001$ in the test group before and after the intervention had a significant difference. In confirmation of the present study results, Moke and Woo during their study aimed to determine the effect of surface stroke back massage on anxiety, shoulder pain, systolic and diastolic blood pressures, and heart rate of the people with brain stroke, and showed significant difference between average systolic and diastolic blood pressures before and after the intervention in the test group ($p < 0.05$). This encouraged nurses to earn knowledge and skill about massage therapy and recommended that this medicine should be used as a non-pharmacological treatment along with other treatments.³⁵

Olney, also in his study in 2005 on patients with hypertension and in 2007 on patients with high blood pressure and prehypertensive clients, measured the average systolic and diastolic blood pressures before and after the intervention in the different test groups and stated that massage therapy can be effective in control-

ling high blood pressure. Referring to other effects of massage therapy such as pain relieving, improve breathing, sleep pattern, nutrition and etc., Olney required the nurses to learn massage techniques and believed this could reduce stress of the patients and provide better relationship of the nurse health behavior with the patient.^{31,10}

Study results of Kaye et al (2008) on 263 male and female samples with hypertension also indicated the efficacy of massage therapy on mean arterial blood pressure and systolic and diastolic blood pressures.⁸ They stated that definitely future studies would determine other advantages of massage on people and would evaluate the mechanisms of the effect of massage on blood pressure. Researchers, according to very few studies about these effects announced that such studies illustrated a clear, promising and encouraging viewpoint for conducting other studies in this regard in a near future.

Jouzi et al (2006) also in a study aimed to determine the effect of massage therapy on blood pressure of the patients with stroke in the massage group and showed lower average systolic blood pressure after the study 125.4 (11.8) compared to that before the study 136.0 (14.8) ($p < 0.05$) and also lower average diastolic blood pressure after the study 78.8 (9.0) compared to that before the study 86.7 (12.4) ($p < 0.05$); the differences were both significant. He suggested that given the minimal cost and desired effects of massage therapy, education of this technique should be included in curricula and retraining courses of the employed nurses.³⁶

Aourell et al (2005), in a 12-week study on 15 healthy men, despite two intervention groups and regardless of slight differences between the two groups, believed the decrease in systolic blood pressure was due to rapid effect of massage therapy but the decrease in diastolic blood pressure was secondary persistent and prolonged sensory stimulations.³⁷ Finally, the researcher suggested that massage therapy can be used as a complementary medicine in treating hypertension or in other words, as an additional medical treatment along with treatment

of these patients. It should be noted that low study samples, different target populations, the difference in the areas of massage and lack of a control group were the considerable notes in this study.

Whereas, Hernandez et al (2000) according to the lack of a significant difference of systolic blood pressure before and after the intervention in the test group ($p > 0.05$) announced that massage failed to be effective on reducing systolic blood pressure, comparing the average diastolic blood pressure at the beginning and end of the study in the test group ($p < 0.05$) stated that massage therapy probably was effective on reducing diastolic blood pressure and its related symptoms in the hypertensive patients.³ Hernandez et al believed perhaps systolic blood pressure was influenced by the benefits of massage therapy in a long term period. However, different results of their study with the present study can be originated from various reasons; e.g., low number of the samples (15 in each group) in this study could be effective on the results.

On the other hand, the used barometer had likely been a digital barometer which had not been mentioned about its calibration during the study. It should be noted that study samples were hypertensive patients and the difference in the target population and baseline blood pressure between Hernandez et al and the present study could influence the results. On the other hand, according to the study results of Cambron et al depending on the type of massage, different results would be obtained. In researchers' view, citing the scientific sources, issues such as differences in massage areas, duration of massage, density and distribution between massage therapy sessions can create different results.³⁸

Most importantly, obtained results of such studies which only confine to measure blood pressure at the beginning and end of the study cannot be reliable; because it would be possible that due to some reasons in the last session, blood pressure increase falsely and intervention derived with no effect.

Bost and Wallis (2006) also in a study aimed to determine the weekly effect of massage in 15 minutes on reduction of physical and psychological stress and found no significant difference between the first and the fifth week's mean arterial blood pressures in the test group ($p > 0.05$) but the anxiety of the samples was significantly reduced. Bost and Wallis announced that so far there are many studies indicated the effect of massage on blood pressure of hypertensive people and some other studies indicated inefficacy of massage on blood pressure of the people with normal blood pressure. This study also pointed out that massage failed to reduce normal blood pressure of the nurses.³⁹ However, it should be considered that since one of the most important reasons of blood pressure changes is the anxiety level, certainly reducing the anxiety in long term period can reduce the blood pressure. Future studies with more concentration on blood pressure and application of accurate tools are warranted.

In association with the third objective of the study, paired t-test showed that average systolic blood pressure and average diastolic blood pressure before the study (the first session) in the control group had no significant difference with those after the end of study (the last session) period ($p > 0.05$).

In confirmation of the present study results, Moke and Woo in their study stated no significant difference between average systolic and diastolic blood pressure before the routine care and after that in the control group ($p > 0.05$).³⁵

Olney also during his study in 2005 on patients with hypertension and in 2007 on patients with high blood pressure and prehypertensive clients showed lack of significant difference between average systolic and diastolic blood pressure before and after the study in the control group.^{10,31}

It is interesting that in the study of Jouzi et al (2006), in the control group, average systolic and diastolic blood pressure after the study had a significant difference compared to those before the study ($p < 0.05$), i.e., not only it not remained almost constant, also had a significant difference.³⁶ As well with a little accurate notice

ing in the present study, we could realize a little increase of average systolic blood pressure at the end of the study compared to that in the beginning of study.

Study of Hernandez et al (2000) also confirmed lack of significant difference between systolic blood pressure before and after the study in the control group.³

Bost and Wallis also stated the lack of a significant difference in the average pressure before and after the study in the control group.³⁹

In association with the fourth objective of the study, independent t-test showed that in the tenth session after the intervention period, there was a significant difference between the test and control group in average systolic blood pressure and average diastolic blood pressure at the end of the intervention.

Evaluation of durability of the massage effects on blood pressure also indicated that 72 hours after finishing the study, still there was a significant difference between the test and control groups in systolic and diastolic blood pressure ($p < 0.001$).

In confirmation of the present study, we can point to the study of Moke and Woo (2006) in which the average systolic and diastolic blood pressures had a significant difference in both groups after the intervention ($p < 0.05$).³⁵

Three days after the end of the intervention, also the study samples of the test group had a significant difference with the control group in terms of systolic and diastolic blood pressures ($p < 0.05$) which indicated that the effect of massage therapy would remain in effect at least 3 days after conducting the intervention. The study of Olney (2005) also announced the presence of a significant difference of average systolic blood pressure between the test and control groups after the intervention and also average diastolic blood pressure between the two groups after the intervention.¹⁰ Besides, follow-up treatment after 48 hours after the intervention indicated a significant difference between the two groups and durability of the massage effect. Study results of Olney (2007) also showed that the two groups at the end of the study had a significant difference in terms of

systolic and diastolic blood pressures.³¹ But, this difference in the intervention group which were different only in the number of the sessions was not significant.

The study of Bost and Wallis showed no significant difference in mean arterial blood pressure between the two groups after the intervention ($p = 0.73$)³⁹ which could be originated from lack of efficacy of massage therapy in the study of these researchers due to the above-mentioned reasons. Results of Jouzi et al showed that the two groups had a significant difference at the end of the study in terms of systolic blood pressure ($p < 0.05$) but had no significant difference in terms of diastolic blood pressure ($p > 0.05$)³⁶ which justified the effect of massage on diastolic blood pressure in long term period. Hernandez et al (2000) also announced that after the intervention, there was not a significant difference between the two groups in terms of systolic blood pressure, but diastolic blood pressure after the intervention had a significant difference between the two groups.³ This also was probably due to lack of efficacy of massage on the systolic blood pressure during the study of these researchers.

Generally, during 10 sessions of the intervention, average systolic and diastolic changes

in the test group in comparison with the control group in this stud showed a significant difference ($p < 0.001$).

Many of the researchers also have considered the slight blood pressure reduction worthwhile and believed it can cause immunization from the side effects. Now, according to the obtained findings of the present study, it can be concluded that massage therapy, regardless of its unknown mechanism can significantly reduce the blood pressure of the clients and prevent from its side effects; so that average systolic and diastolic blood pressure from the prehypertension range from the beginning of the study have been led to the normal blood pressure. Therefore, the researchers introduced the massage therapy as an effective nursing intervention on adjusting blood pressure of the prehypertensive clients.

The authors declare no conflict of interest in this study.

Suggestion for further researches

It is suggested that the present study comparatively be repeated in men and women, in prehypertensive people and those with hypertension and also, the sustainability and durability of massage therapy effects on the blood pressure of the prehypertensive clients at different times after the intervention be evaluated.

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