

THE EFFECTS OF FOOT REFLEXOLOGY MASSAGE ON THE MEAN ARTERIAL PRESSURE IN HEALTHY VOLUNTEERS OF DIFFERENT AGE

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Reflexology is a systematic practice in which applying some pressure to any particular points on the feet and hands give impacts on the health of related parts of the body [1, 2]. Each point of the pressure acts as the sensors on the feet and hands and is links with different parts of body specifically. These sensors will be stimulated by applying the reflexology technique in order to improve the blood and energy circulation, give sense of relaxation, and maintain the homoeostasis [3]. Anecdotal evidence has shown potential benefits of reflexology in a variety of health conditions [4]. However, the efficacy of reflexology has yet to be determined. The aim of this study was to assess the effects of foot reflexology massage on functioning of the cardiovascular system. For this purpose, the mean arterial pressure (MAP) were calculated.

Materials and methods. The study was conducted among men and women divided into four age groups: Group 1 – Women aged 20-50 years (n=15); Group 2 – Women aged 50-80 years (n=15); Group 3 – Men aged 20-50 years (n=14); Group 4 – Men aged 50-80 years (n=13). The range of study included measurements of systolic and diastolic pressure and pulse before each session of foot massage (at the resting period), and after the completion of reflexology session. In total, ten such session were done. For the analysis, the values of hemodynamic indices obtained in the dynamics of the first and tenth sessions were used and analyzed. On the basis of these measurements the MAP was calculated.

MAP, or mean arterial pressure, is defined as the average pressure in a patient's arteries during one cardiac cycle. It is considered a better indicator of perfusion to vital organs than systolic blood pressure (SBP). True MAP can only be determined by invasive monitoring and complex calculations; however it can also be calculated using a formula of the SBP and the diastolic blood pressure (DBP). To calculate a mean arterial pressure, double the diastolic

blood pressure and add the sum to the systolic blood pressure. Then divide by 3. Here are the steps for this calculation: $MAP = (SBP + 2 (DBP))/3$ [5].

Results are expressed as mean $\pm$ S.E.M. All variables were tested for normal distribution using the Kolmogorov-Smirnov test ($p > 0,05$). In order to find significant differences ($p < 0,05$) between states before and after sessions, Wilcoxon signed-rank test was applied to the data, while significant differences ($p < 0,05$) between aged groups were assessed by Kruskal-Wallis U test [6]. All statistical analyses were performed using STATISTICA 8.0 software (StatSoft, Poland).

Results. The analysis of the data confirms the decline of the mean blood pressure after foot reflexology massage (Fig.).

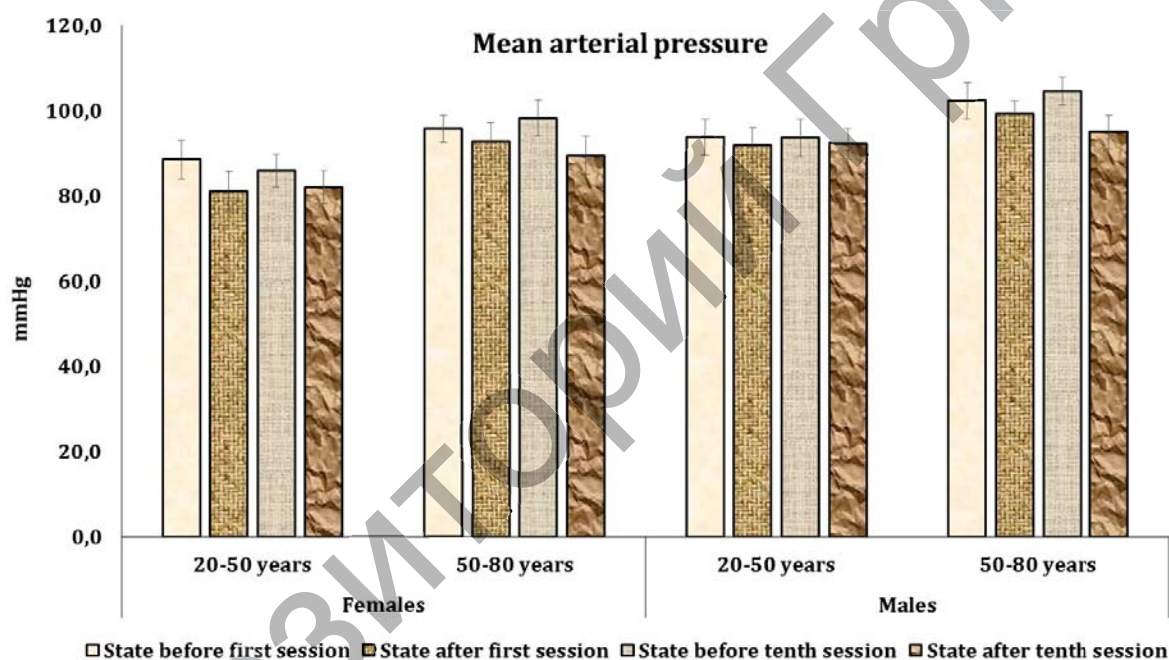


Fig. – Changes in mean arterial pressure (mmHg) in groups of men and women of different age after a foot massage treatments

It has been suggested that there was a downward trend for MAP values in both women and men groups. Although in male group, this tendency was less visible. For females in the age 20-50 years, the MAP for the first procedure in state before session was (88.50 ± 4.51) and (81.05 ± 4.78) mmHg after the session. However, in the case of the last procedure – (86.00 ± 3.86) and (82.05 ± 3.79) mmHg, before and after session, respectively. In the group of women aged 50-80 years also tend to decrease the MAP. For the first procedure, values were (96.74 ± 3.21) and (92.72 ± 3.49) mmHg before and after session, and in

the case of the last procedure – (98.26 ± 4.20) and (89.50 ± 4.47) mmHg, respectively. In the group of men aged 20-50 years, MAP were (93.83 ± 4.17) and (91.82 ± 4.07) mmHg before and after first session, while before and after tenth session – (93.67 ± 4.41) mmHg and (92.33 ± 3.67) mmHg before and after session. In the group of men aged 50-80 years, the following trend was observed. For the first procedure, the MAP was (102.33 ± 4.35) and (99.25 ± 3.03) mmHg before and after session, for tenth procedure – (104.57 ± 3.25) and (95.00 ± 3.93) mmHg, respectively. Comparing groups of women and men in different age categories, it is clear that the differences between the categories were really small. More important changes were occurred within each category (Fig. 1).

Data obtained in our previous study showed that foot massage in men and women of different age was effective in cardio-vascular system functioning [7, 8]. A decrease in the SBP after the last treatment of foot massage in both age groups of women and men in the age group of 50-80 years was observed. DBP has a decreased trends in groups of men and women after a foot massage treatments as the first, so after the last treatment. A decrease in mean arterial blood pressure in the groups of women and men aged 50-80 years was noted. Pulse also has a decreased trends in the groups of women and men in the dynamics of the first treatment of foot massage. A statistically significant increase in the stroke volume in the group of women aged 20-50 years in the dynamics of the first session was observed. The cardiac output and cardiac index have increased trends in the groups of women and men in the dynamics of the first and last session of foot massage, except for a group of men aged 20-50 years. A statistically significant increase of stroke volume in the groups of women in the dynamics of the first session of foot massage was noted [7]. The positive effect of foot reflexology massage on the cardiovascular functioning causes a reduction in the number of women with low level of cardiovascular system functioning after the last session and increasing the number of men with high level of the cardiovascular system functioning. Nevertheless, high values of bloodstream efficiency ratio were noted. It provides to increase the efficiency of the cardiovascular system after foot reflexology massage. The decrease in the value of the total peripheral blood resistance ratio indicates a decrease in the partial blood pressure on vessels, which in turn lowers blood pressure [8].

Our study is in agreement with results of other researchers. For example, Eguchi and co-workers (2016) have investigated the effects of aroma foot massage on blood pressure, anxiety, and health-related quality of life (QOL) in Japanese community-dwelling men and women using a crossover randomized controlled trial. The self-administered aroma foot massage intervention significantly decreased the mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) as well as the state anxiety score, and tended to increase the mental health-related QOL scores. The results of Eguchi and co-workers (2016) suggest that aroma foot massage may be an easy and effective way to improve mental health and blood pressure [9].

Ebadi and co-workers (2015) have investigated the efficacy of foot reflexology on physiological parameters and mechanical ventilation weaning time in patients undergoing open-heart surgery [10]. This was a double blind three-group randomized controlled trial. Totally, 96 patients were recruited and randomly allocated to the experimental, placebo, and the control groups. Study groups respectively received foot reflexology, simple surface touching, and the routine care of the study setting. Physiological parameters (pulse rate, respiratory rate, systolic and diastolic blood pressures, mean arterial pressure, percutaneous oxygen saturation) and weaning time were measured. The study groups did not differ significantly in terms of physiological parameters ($P>0.05$). However, the length of weaning time in the experimental group was significantly shorter than the placebo and the control groups ($P<0.05$). The study findings demonstrated the efficiency of foot reflexology in shortening the length of weaning time [10].

Lee and Yeun (2017) have examined the effects of combined self-administered foot massage and cognitive behavioral therapy on the psychophysiological stress response in Korean middle-aged women [11]. Depression, anxiety, stress, blood pressure, heart rate, blood glucose (BG), and oxygen saturation were measured at baseline and 3-week follow-up in fifty-three women aged 45-64 years were randomly assigned to Group A (intervention, $n=31$) or B (usual care, $n=30$). Mean depression scores ($p=0.021$), stress scores ($p=0.009$), SBP ($p=0.035$), and BG levels ($p=0.007$) had decreased significantly subsequent to the intervention. Combined self-administered foot massage and cognitive behavioral therapy led to reductions in depression, stress, SBP, and BG levels. Therefore, the intervention

could be an effective means of reducing the stress response in middle-aged women [11].

Few studies suggest that from a cardiovascular point of view, reflexology (as delivered) would appear to have a limited (if any) effect on the cardiovascular system [12, 13]. Rollinson and co-workers (2016) have evaluated the effects of reflexology on arterial compliance in healthy volunteers. Reflexology had no significant effect on heart rate, blood pressure or augmentation index (all $p > 0.05$). In healthy volunteers, there were no consistent changes in haemodynamic parameters with a single brief reflexology treatment [12]. Few studies of reflexology controlled for nonspecific effects in order to isolate any specific active component, despite the hemodynamic claim being a key part of the therapeutic value of reflexology. Therefore, further research approaches using more innovative designs and robust methods that can allow a treatment-induced, therapeutically beneficial hemodynamic effect to reveal itself are needed [13].

The foot massage non-significantly decreased the mean arterial pressure. This trend indicates about increase of the functional capability of the cardiovascular system in men and women after foot reflexology massage. The results suggest that foot massage may be an easy and effective way to improve blood pressure.

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