

# Effect of Laser Acupuncture on Reducing Postmenopausal Hypertension

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## ABSTRACT

*This study was conducted to determine the effect of laser acupuncture on postmenopausal hypertension. Sixty post menopausal women participated in this study. They complained from high blood pressure (diagnosed by gynecologist/physician). They were chosen from Sayed Galal Al-Azhar University Hospital in Cairo. Their ages were ranged from 50 to 65 years old and their blood pressure ranged from 140\90 mmHg to 170\105mmHg. They were divided randomly into two groups equal in number, group (A) was treated by antihypertensive drug (Captopril -25 mg twice daily) only while group (B) was treated by antihypertensive drug (Captopril-25 mg twice daily) and laser acupuncture sessions for three acupuncture points, 4 minutes for each point, the session duration was 12 minutes, day after day, for six weeks. The study was conducted from 10 January to 15 July 2011. Hypertension was evaluated by the sphygmomanometer instrument before and after the program for both groups. The obtained results showed a statistically significant decrease ( $P<0.01$ ) in blood pressure in both groups, when both groups were compared together, a statistically significant decrease ( $P<0.01$ ) in blood pressure was found in group (B) than group (A). So that, it could be concluded that the laser acupuncture was very effective adjunct method in reducing hypertension in postmenopausal women.*

**Key words:** Postmenopause - Systolic blood pressure - Diastolic blood pressure - Laser - Acupuncture.

## INTRODUCTION

Menopause is a term used to describe the permanent cessation of the primary functions of the human ovaries: the ripening and release of ova and the release of hormones that cause both the creation of the uterine lining and the subsequent shedding of the uterine lining (the menses or the period). Menopause typically (but not always) occurs in women in midlife,

during their late 40s or early 50s, and signals the end of the fertile phase of a woman's life<sup>30</sup>.

Menopausal symptoms affect about 70% of women approaching menopause. Common menopausal symptoms are menstrual irregularities that periods may come more frequently, shorten or lengthen, and become light or heavy, hot flash which is sudden feeling of warmth or heat that spreads over the body creating redness particularly noticeable in face and upper body, mood swing that the mood one minute up and another minute down, insomnia, vaginal dryness that vagina loss usual moist and may be associated with irritation, fatigue, weight gain especially in abdomen and depression<sup>10</sup>.

Hypertension refers to high systemic arterial blood pressure. A broad range of elevated systolic and diastolic pressures is found in large surveys of adult populations. So that arbitrary levels have been established to define persons who have an increased risk of developing a morbid cardiovascular event and/or will benefit from medical therapy<sup>5</sup>.

Isolated systolic pressure greater than 160 mmHg is often seen in elderly patients. This is called isolated systolic hypertension of elderly. Excessive elevation of systolic pressure in elderly patients may be falsely determined when measured by the occlusive cuff and a standard sphygmomanometer due to calcification of the arteries. This is called pseudo hypertension<sup>15</sup>.

Matthews, 2007<sup>22</sup> reported that, after age 50, about 30-50% of women develop hypertension (>140\90 mmHg). High blood pressure might be the first sign that cardiovascular system is beginning to show some wear & tear. As estrogen decreases, the wall of blood vessels may become less flexible & leads to postmenopausal hypertension which is a risk factor for stroke and heart diseases.

Hypertension often clusters with other risk factors such as overweight, elevated insulin resistance, diabetes and lipid abnormalities. In the women's health study it was shown in almost 40,000 healthy women (>45 years) that an elevated blood pressure increases cardiovascular risk and that hypertension is a strong predictor for the development of type II diabetes. Even in premenopausal women, hypertension has been shown to be a potent risk factor for the presence of coronary artery disease<sup>4</sup>.

Worldwide, according to seven countries study, each 10 mm Hg increase in blood pressure doubles the risk of death in hypertensive patients. As hypertension is an independent risk factor for the two leading causes of death in Brazil, myocardial infarction and stroke<sup>8</sup>.

Laser irradiation would be classified as "low intensity" or "low level" designed to stimulate tissue and "High Power laser" designed to cut or destroy tissue and thus by definition a thermal, although monitoring of skin temperature did show measurable changes as a result of such irradiation. Also, the definition of a "low energy laser" is one that produces an energy density so low that temperature elevations are limited to less than 0.1-0.5C and any observed biological effects are consequently described to non-thermal events<sup>12</sup>.

It has documented that low intensity laser therapy may cause many reactions and biological effects within the human body<sup>17</sup>. These reactions occur due to the photochemical and/or photophysical action of radiation and not merely as result of heating. The primary photochemical and/or photophysical events are proposed to occur in the mitochondria and in the cytoplasmic membrane; the light is absorbed by enzymes in the mitochondria, which activates the respiratory chain and lead to changes in the mitochondria and cytoplasm<sup>14</sup>.

The use and application of low energy laser therapy have steadily grown in the latter years among a number of clinical specialties including physiotherapy and dental medicine. Within a relatively short period of time, laser has become an accepted part of routine

physiotherapy management for a variety of conditions<sup>2</sup>.

A central tenet of acupuncture contents that energy flows through the body along defined subsurface paths. The maintenance of good health requires that such flow be in balance conversely, any disturbance in this flow results in an energy imbalance, either an excess or a deficiency, which in turn results in disease. Acupuncture attempts to regulate and restore energy balance by stimulating specific points along the paths and hence treat the disease<sup>32</sup>.

Acupuncture has been used for more than two thousand years in china and Japan. The first European and American publications on acupuncture appeared in the early nineteenth century<sup>6</sup>. The concepts which prompted the ancient Chinese to use acupuncture for therapeutic purposes were intricately bound up with their views concerning all aspects of the living world, including in particular their belief in the existence of two cosmic regulators known as yin and yang. It was considered that in order to be healthy these two opposing forces have to be in correct state of balance and that it is when this is not so that disease occurs<sup>1</sup>.

The integration of traditional Chinese and Western medicine and their clinical effects have been widely evaluated. Many studies have shown that using a combination of these two remedies has resulted in better outcomes than using only one of them<sup>20</sup>.

Laser acupuncture is the irradiation of acupuncture points with low intensity laser which is alternative to invasive acupuncture needling<sup>3</sup>. Laser acupuncture is advantageous in terms of side effects compared to classical acupuncture techniques and studies showed that there are positive effects can be assumed in myofascial pain syndromes of the neck, back and shoulder<sup>25</sup>. Laser acupuncture was effective at stage I and II of hypertensive disease<sup>26</sup>.

## SUBJECTS, MATERIAL AND METHODS

This study is an attempt to find out the effect of laser acupuncture on reducing post menopausal hypertension. Sixty women after

menopause shared in this study complained from high blood pressure (diagnosed by gynecologist/ physician) were chosen from Sayed Galal Al-Azhar University Hospital in Cairo. Their ages ranged from 50 to 65 years old and their blood pressure was ranged from 140/90 mmHg to 170/105mmHg. They were divided randomly into two groups equal in number. Patients of group (A) was treated by antihypertensive drug (Captopril-25 mg twice daily) while group (B) were treated by antihypertensive drug (Captopril-25 mg twice daily) and laser acupuncture sessions for 3 acupuncture points, 4 minutes for each point, 3 sessions/week for six weeks. The study was conducted from 10 January to 15 July 2011.

### Laser acupuncture program:

Before starting the first treatment session, each patient was instructed briefly about the nature of the treatment to gain the patient's confidence and cooperation and advised to wear goggles throughout the treatment session. The surface of the treated skin was cleaned with alcohol wipe in order to remove any material on the surface that might absorb or scatter the radiation. The woman was sitting in a relaxed comfortable sitting position with her back well supported. She was breathing deeply during session and wore loose clothes and to stay warm following the session. The laser applicator was applied to the surface before switching on apparatus, it's important to maintain the laser applicator in contact with the tissues, so the beam was applied at right angle to achieve maximum penetration. The device was switched off before removing the applicator from contact skin.

This program was done for 6 weeks, 3 sessions/week, the duration of each session

was twelve minutes, 4 minutes for each acupuncture points.

### Acupuncture points are:

#### 1- Hegu (LI 4):

Location: It is situated in the web between the forefinger and thumb on the posterior aspect of the hand and it could be located when the forefinger and the thumb are adducted at the highest point of the muscles on the back of the hand.

#### 2- Quchi (LI 11):

Location: At the outer end of the elbow crease when the elbow is semi flexed.

#### 3- Sanyinjiao (Spleen 6):

Location: cun (It is the Chinese inch which equal to width of thumb across the interphalangeal joint). It is located three cun (equal the width of middle four fingers) directly above the tip of the medial malleolus, on the medial border of the tibia.

The Student t- test was used to compare between pre and post treatment results.

## RESULTS

### A- Physical characteristics of the patients.

Control group (A): Their mean age ( $58.4 \pm 4.65$ ) years, mean weight ( $88.06 \pm 10.45$ ) kilograms (Kg), and mean height ( $164.13 \pm 6.55$ ) centimeters (cm).

Study group (B): Their mean age ( $59.7 \pm 4.41$ ) years, mean weight ( $89.23 \pm 8.09$ ) kilograms (Kg), and mean height ( $165.86 \pm 9.74$ ) centimeters (cm).

There was no significant difference between both groups regarding their ages, weights and heights as the t and P-values were (1.1, 0.27), (0.48, 0.63), and (0.8, 0.42) respectively. Table (1).

**Table (1): Physical characteristics of patients in both groups (A&B).**

Items	Group A		Group B		Comparison		S
	Mean	$\pm$ SD	Mean	$\pm$ SD	t-value	P-value	
Age (yrs)	58.4	$\pm 4.65$	59.7	$\pm 4.41$	1.1	0.27	NS
Weight (Kg)	88.06	$\pm 10.45$	89.23	$\pm 8.09$	0.48	0.63	NS
Height (cm)	164.13	$\pm 6.55$	165.86	$\pm 9.74$	0.8	0.42	NS

\*SD: standard deviation, P: probability, S: significance, NS: non-significant.

**B- Systolic blood pressure:**Group (A):

Table (2) demonstrated the systolic blood pressure pre and post treatment for group (A). There was a highly significant difference between pre and post treatment as pretreatment the systolic blood pressures was ( $154.33 \pm 10.82$ ) and post treatment it was ( $135.16 \pm 11.17$ ) where the t-value was (10.8), P-value was (0.0001) and the percentage of improvement was 12.41 % (reduction).

Group (B):

Table (2) demonstrated the systolic blood pressure pre and post treatment for group (B). There was a highly significant difference between pre and post treatment as the pre treatment the systolic blood pressure was ( $153.3 \pm 9.78$ ) and post treatment it was ( $129.56 \pm 7.08$ ) where the t-value was (12.44), P-value was (0.0001) and the percentage of improvement was 15.47 %.(reduction).

**Table (2): Systolic blood pressure pre and post treatment for both groups (A&B).**

Systolic blood pressure	Group A (St group)		Group B (Study group)	
	Pre	Post treatment	Pre treatment	Post treatment
Mean	154.33	135.16	153.3	129.56
$\pm$ SD	$\pm 10.82$	$\pm 11.17$	$\pm 9.78$	$\pm 7.08$
Mean difference	19.16		23.73	
Percentage of change	12.41 %		15.47 %	
t-value	10.8		12.44	
P-value	0.0001		0.0001	
S	HS		HS	

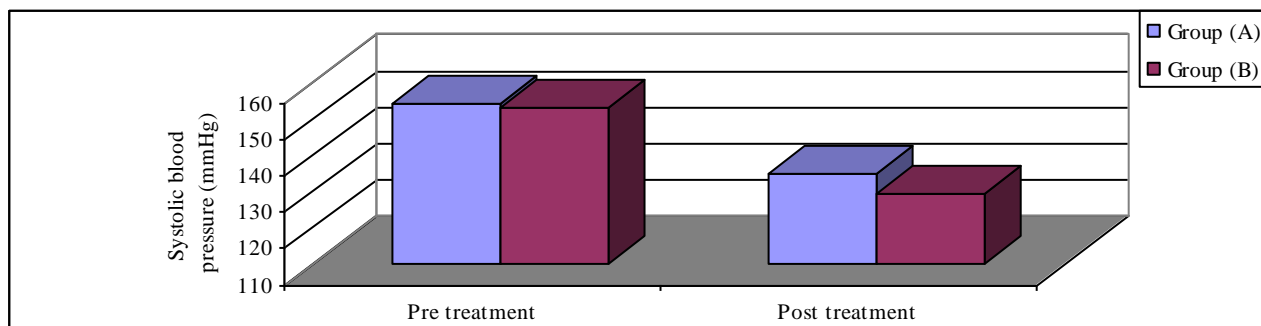
**Between Groups:**

Table (3) revealed the independent t-test results for the systolic blood pressure pre and post treatment between groups A and B. There was no significant difference in pre treatment

values where the t-value was (0.38) and P-value was (0.7). But there was a significant difference in the post treatment values ( $P < 0.05$ ), where the t-value was (2.31) and p-value was (0.02). (Fig.1).

**Table (3): Independent t-test between groups A& B for systolic blood pressure pre and post treatment.**

Independent t-test	Systolic blood pressure	
	Pre	Post
Mean difference	1.03	5.6
t-value	0.38	2.31
P-value	0.7	0.02
S	NS	S



**Fig. (1): Systolic blood pressure pre and post treatment of groups (A&B).**

**C- Diastolic blood pressure:**Group (A):

Table (4) the diastolic blood pressure pre and post treatment for group (A). There was a

significant difference between pre and post treatment as pretreatment the diastolic blood pressure was ( $96.16 \pm 4.86$ ) and post treatment was ( $88.26 \pm 6.11$ ) where the t-value it was

(7.79), P-value was (0.0001) and the percentage of improvement was 8.21 %.(reduction).

#### Group (B):

Table (4) demonstrated the diastolic blood pressure pre and post treatment for group (B). There was a highly significant

difference between pre and post treatment as pretreatment the diastolic blood pressure was  $(96.93 \pm 5.11)$  and post treatment it was  $(84.96 \pm 3.55)$  where the t-value was (14.72), P-value was (0.0001) and the percentage of improvement was 12.33 %.(reduction).

**Table (4): Diastolic blood pressure pre and post treatment for both groups (A&B).**

Diastolic blood pressure	Group A (St group)		Group B (Study group)	
	Pre	Post treatment	Pre treatment	Post treatment
Mean	96.16	88.26	96.93	84.96
±SD	±4.86	±6.11	±5.11	±3.55
Mean difference	7.9		11.96	
Percentage of change	8.21 %		12.33 %	
t-value	7.79		14.72	
P-value	0.0001		0.0001	
S	HS		HS	

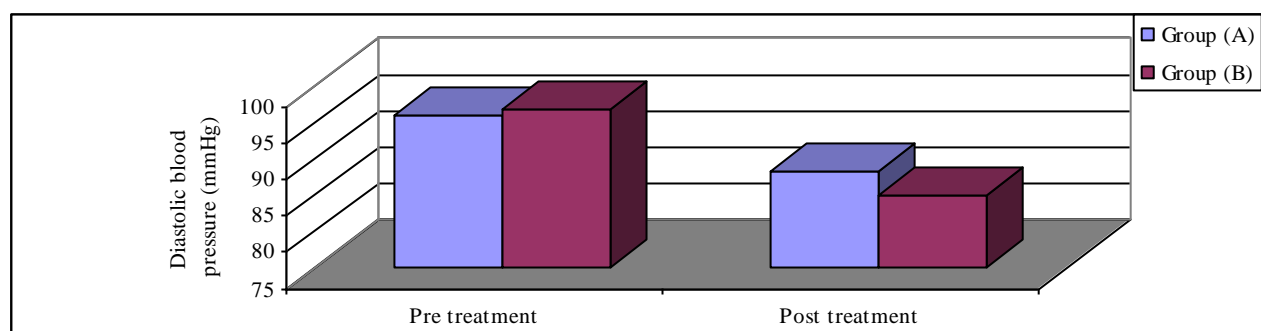
#### Between Groups:

Table (5) revealed the independent t-test results for the diastolic blood pressure pre and post treatment between groups A and B. There was non significant difference in pre treatment

values where the t-value was (0.59) and p-value was (0.55). But there was a significant difference in the post treatment values ( $P < 0.05$ ) where the t-value was (2.55) and P-value was (0.01). (Fig.2).

**Table (5): Independent t-test between groups A& B for diastolic blood pressure pre and post treatment.**

Independent t-test	Diastolic blood pressure	
	Pre	Post
Mean difference	0.76	3.3
t-value	0.59	2.55
P-value	0.55	0.01
S	NS	S



**Fig. (2): Diastolic blood pressure pre and post treatment of groups (A&B).**

## DISCUSSION

Matthews, 2007 reported that, after age 50, about 30-50% of women develop hypertension ( $>140/90$  mmHg). High blood pressure might be the first sign that cardiovascular system is beginning to show some wear & tear. As estrogen decrease, the wall of blood vessels may become less flexible

& lead to postmenopausal hypertension which is a risk factor for stroke and heart diseases.

The result of this study found that, there was statistically highly significant decrease ( $P < 0.01$ ) in blood pressure in both groups, but when compared the two groups we found that, group (B) which treated with antihypertensive drug and laser acupuncture showed a statistically significant decrease ( $P < 0.01$ ) in

blood pressure than group (A) which treated with antihypertensive drug only.

The results of the study are supported by Odud and Potapenko (1990)<sup>24</sup>, who found that the use of laser puncture allowed patients to reduce their dosage of hypertensive drugs.

The results of the study agreed with those of Williams et al., (1991)<sup>33</sup>, who found that a significant reduction in diastolic BP in hypertensive subjects when treated with selected four acupuncture point (Liver 3, Stomach 36, Large Intestine 11, and the Groove). Thus, low-intensity laser radiation is a highly effective treatment in essential hypertension stage I.

The results of the study come in consistent to with those of Chiu et al. (1997)<sup>7</sup>, who found that the results confirm that acupuncture decreases blood pressure in hypertensive patients.

The results agreed with those of Lichstein et al. (2000)<sup>19</sup>, who suggested that acupuncture may be efficacious in decreasing arterial BP in hypertensive patients.

The results of the study supported by with those of Velizhanina et al., (2001)<sup>29</sup>, who found that laser treatment significantly lowered systolic, diastolic, mean arterial pressure and Total peripheral vascular resistance also decreased. A good hypotensive effect was achieved in 90.4 percent of cases. Thus, they declared that low-intensity laser radiation is a highly effective treatment in treating essential hypertension stage I.

The results of the study agreed with those of Jiang (2003)<sup>13</sup>, who found that acupuncture alone reduced BP similarly as antihypertensive medication leading to no significant results but when given medication with acupuncture it gave additional effect.

The results of the study come in consistent with this of Sobetskii (2003)<sup>26</sup>, who found that laser acupuncture was effective at stage I of hypertensive disease while acupuncture had a more potent hypotensive effect and can be used both in hypertensive disease stage I and II. Action on the acupuncture points and zones normalizes also parameters of the central and peripheral hemodynamics in hypertensive patients.

The results of the current study are also supported by those of Wei and John (2006)<sup>31</sup>,

who has found that acupuncture, can modulate cardiovascular function, particularly BP reduction, and concludes that future treatment of hypertension can potentially include acupuncture as a nonpharmacological intervention.

Also the results of the study were supported by Yin et al. (2007)<sup>34</sup>, who found that acupuncture seems to offer an additional benefit to the treatment of hypertensive patients such as medication or lifestyle modification for hypertensive or pre-hypertensive subjects.

The results of the study come in consistent with those of Flachskampf et al. (2007)<sup>9</sup> who found that after 6 weeks of treatment significantly lowered mean 24-hour ambulatory blood pressures; but the effect disappeared after cessation of acupuncture treatment, acupuncture appears to be an effective and safe therapeutic modality for the treatment of mild to moderate hypertension in otherwise healthy patients in the age range of 45 to 75 years.

The result of the study agreed with those of Tina Beychok (2007)<sup>28</sup>, who found that, acupuncture may offer an alternative antihypertensive therapeutic option. Acupuncture effectively lowered systolic and diastolic blood pressures during the treatment period with no or minimal side effects. Patients with mild or moderate hypertension who want to avoid drug therapy or are attracted to the spiritual foundations of acupuncture may therefore be candidates for such a therapy. This modality might also serve as an additional option together with drug therapy.

The results come in consistent with those of Zang et al., (2008)<sup>37</sup>, who found that low laser treatment of acupoint resulted in lowering blood pressure by stimulating the LI 11 and LI 4 acupuncture point.

The result of the study agreed with those of Zak (2010), who found that electroacupuncture on Quchi (LI 11) and Taichong (LR 3) has long-term antihypertensive effect and improves effectively day-night rhythm variation in young patients with hypertension. Quchi (LI 11) and Taichong (LR 3) are the effective pair

points for hypertension treated with acupuncture.

Results of this study come in consistent with those of Sunay et al. (2011)<sup>27</sup>, who found that acupuncture was effective in reducing menopausal complaints and can be considered as an alternative therapy in the treatment of menopausal symptoms. That was concluded by those authors in the study conducted in Ankara Training and Research Hospital to investigate whether acupuncture has an effect on menopausal symptoms and to explore whether this effect is related to changes in hormone levels.

In contradiction, the results of this study disagreed with the results of Kraft and Coulon (1999)<sup>16</sup>, who found that acupuncture with a standardized combination of acupuncture points according to the Chinese syndrome, can transitorily reduce postmenopausal complaints, but does not alter blood pressure or serum lipids at the same time.

The result of the study come in contrary with those of Yue (2000)<sup>35</sup>, who found that acupuncture is an effective treatment but did not produce better results than other treatments for hypertension or stroke.

The results of this study appoint the results of Macklin et al. (2006)<sup>21</sup>, who found that acupuncture are unlikely to achieve clinically meaningful reductions in systolic blood pressure or diastolic blood pressure for the average patient with mild-to-moderate hypertension.

The result of the study were disagreed with those of Yin et al. (2007)<sup>34</sup>, who found that no significant BP change after 4 weeks of acupuncture but, after 8 weeks BP significantly reduced.

Also, the results of this study come in contrary with the results of Lee et al. (2009)<sup>18</sup>, who found that the notion that acupuncture may lower high BP is inconclusive.

The result of the study are disagreed with those of Howard (2009)<sup>11</sup>, who found that clinical trials have failed to demonstrate that there is a reliable difference between true and sham acupuncture as defined by traditional acupuncture theories. Scientific rationales for acupuncture are needed to define valid controls. The theoretical basis for traditional acupuncture practice needs to be re-evaluated.

Also, the result of this study come in contrary with the results of O'Brien et al. (2010)<sup>23</sup>, who found that laser acupoint stimulation does not affect the menopausal symptoms and hot flushes.

## Conclusion

On the basis of the data obtained in the present study, it could be concluded that the laser acupuncture can be considered as an effective adjunct method in reducing hypertension in postmenopausal women.

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### الملخص العربي

#### تأثير استخدام الليزر على مناطق الوخز الأبري في الحد من ارتفاع ضغط الدم لدى السيدات بعد انقطاع الطمث

أجريت هذه الدراسة لمعرفة تأثير الليزر على مناطق الوخز الأبري على ارتفاع ضغط الدم بعد انقطاع الطمث . وقد شارك في هذه الدراسة ستون مريضة مصابة بارتفاع ضغط الدم تم تشخيصهن بواسطة طبيب نساء / باطن ي من مستشفى سيد جلال جامع ة الأزهر بالقاهرة . تراوحت أعمارهن بين 50-65 سنة وتراوح ضغط الدم بين 90/140 و 105/170 ملليمتر زئبق . وقد تم تقسيمهن إلى مجموعتين متساويتين في العدد المجموعة (أ) عولجت باستخدام أدوية لتقليل الضغط ( كابيتوبريل 25 مجم -مرتين يوميا) بينما المجموعة (ب) عولجت باستخدام نفس أدوية تقليل الضغط المستخدمة للمجموعة (أ) ( كابيتوبريل 25 مجم - مرتين يوميا) بالإضافة إلى جلسات الليزر على مناطق الوخز الأبري (3 نقاط) 4 دقائق لكل نقطة ، الجلسة لمدة 12 دقيقة ، 3 مرات أسبوعيا ، لمدة 6 أسابيع . أجريت هذه الدراسة في الفترة من 10 يناير إلى 15 يوليو 2011 . وقد تم قياس ضغط الدم قبل وبعد إجراء برنامج الليزر على مناطق الوخز الأبري لمدة 6 أسابيع وأوضحت نتائج الدراسة وجود انخفاض ذو دلالة إحصائية عالية في ضغط الدم في المجموعتين بعد فترة العلاج وبمقارنته بالنتائج تبين ان الانخفاض في المجموعة (ب) التي عولجت باستخدام الليزر مع أدوية تخفيض ضغط الدم كان اكبر من المجموعة (أ) التي عولجت باستخدام أدوية تخفيض ضغط الدم فقط . وهكذا يمكن أن نستخلص أن الليزر على مناطق الوخز الأبري كان وسيلة مؤثرة ومساعدة في تقليل ضغط الدم لدى السيدات بعد انقطاع الطمث .

الكلمات الدالة : سن ما بعد انقطاع الطمث - الضغط الانقباضي - الضغط الانبساطي- الليزر- الوخز الأبري .