

# Control of high blood pressure by Acupuncture In subjects with essential hypertension

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## Summary:

**Background:** Hypertension is the most common cardiovascular disease; its prevalence increases with advancing age. The risk of cardiovascular disease in adults is lowest with systolic BP <120 mm Hg and diastolic BP < 80 mm Hg and increases progressively with higher systolic and diastolic blood pressures. Acupuncture (from the Latin word acus, "needle", and pungere, meaning "prick") is a technique in which the practitioner inserts fine needles into specific points on the patient's body. Acupuncture could be used as a nonpharmacological way of controlling high readings of blood pressure among cases with essential hypertension. This study aimed to investigate the effects of acupuncture on essential hypertension.

**Patients and Methods:** 51 hypertensive patients of both genders and 30 normotensive control subjects were involved in the study during the period from 1 December 2010 to 28 Feb 2011. Each subject received needling technique at certain acupoints of the body meridians according to Chinese medicine theory for 10 sessions, each session was thirty minutes and the responses were followed up for three months from the last session. Points selected are known as followed in Chinese medicine as ( du 20 , liver 3 and large intestine 11).

**Results :** Patient group which consists of (51) individuals { (37) males and (14) females}, from those 51, there were 39 with response i.e they became normotensive and this represent (76.47%) while the rest were still hypertensive (23.52%) but they showed significant change in all parameters after treatment

**Conclusion:** From this study we conclude that acupuncture decreases blood pressure in hypertensive patients and had no hypotensive effect on normal subjects involved in this study.

Keywords: hypertension, acupuncture.

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## Introduction:

The systolic blood pressure normally is about 120 mmHg, the diastolic blood pressure is about 80 mmHg. The 40 mmHg difference is called the pulse pressure . During physical exertion the systolic blood pressure may briefly attain 200 mmHg. Resting diastolic pressure 90mmHg or more and systolic pressure  $\geq 140$  is called high blood pressure (hypertension). 1 Hypertension currently is defined as a blood pressure of 140/90 mm Hg or higher. Prehypertension is a new designation for mildly elevated blood pressures between 120/80 and 139/89 mm Hg, a level at which progression to hypertension is twice as likely as with a blood pressure below 120/80 mm Hg, and cardiovascular risk retains its continuous log-linear function compared with lower blood pressures. 2 In about 88% of patients with elevated blood pressure, the cause of the hypertension is unknown, and they are said to have essential hypertension. There are data available to support the view that neurovascular compression of the rostral ventrolateral medulla (RVLM) is associated with essential

hypertension in some subjects 3 Acupuncture literally means to puncture with a needle. The term "acupuncture" is used in its broad sense to include traditional body needling, moxibustion, electric acupuncture (electro-acupuncture), laser acupuncture (photoacupuncture), microsystem acupuncture such as ear (auricular), face, hand and scalp acupuncture, and acupressure (the application of pressure at selected sites). 4 In the field of acupuncture, an already accomplished task is the international standardization of nomenclatures for the 14 meridians, their 361 classical acupoints, as well as major extraordinary points. These standardized international codes are in English. For example, for the meridians, they are LU (lung meridian), HT (heart meridian), LI (large intestine meridian), SI (small intestine meridian), and so on. 5 Acupoints of the 14 channels, also known as the "regular points," are distributed along the 12 regular channels and the Du (Governor Vessel) and the Ren (Conception Vessel) Channels, which are the major part of the acupoints. Extraordinary points are those with regular names and regular locations, but are not among the above-mentioned 14 channels. Ashi points are also called tender spots. 6 They found most of the points, except the Qugu

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(CV-2) point that could be located by the naked eyes on the nervous structure, either on the branches of the cranial or the spinal. 7 Theories of acupuncture: Theory of Meridians Meridians are passageways for the flow of "qi" (energy) and "blood", which are the two basic bodily fluids in Chinese medicine. 8 Theory of Qi (Qigong) Qi, pronounced "chee," is your breath, or vital life force healing energy. Gong, pronounced "gung," is practice or work. Qigong is the practice of cultivating and working with this vital life force, life-giving, healing energy. 9

Theory of Yin-Yang: the ancient philosophers observed that in nature many things existed in opposite pairs - for example, day and night, hot and cold, etc. The theory of Yin-Yang holds that two mutually opposite aspects of Qi, Yin and Yang, exist in all things and phenomena in the universe. 10 Theory of Five Elements The theory of the Five Elements concerns the movement and changes of the five basic matters of Wood, Fire, Earth, Metal, and Water. 11

Acupuncture generally works by harmonizing the body's energy balance. In parts of the body where there is too much energy, the needles help to remove the excess and bring the body back into balance. 12 Meridians transport life energy (Qi) along with blood and bodily fluids that nourish and moisten our entire system. It is two way street from outside to inside, transporting diseases or the healing stimulation of acupoint. In fact illness results from the traffic jams in these channels. 13 Physiologic effect of acupuncture on hypertension: Endogenous opioids participate in depressurization induced by acupuncture. The upregulation of the opioid system may regulate other neurotransmitter systems, such as the monoamine neurotransmitters like noradrenaline, dopamine, and 5-HT, thus modulating the sympathetic activity and blood pressure. 14 The decrease in plasma renin activity appeared to be specific for acupuncture. 15 also related to the activity of GABA receptors in rVLM 16 Acupuncture on hypertensives showed that the plasma endothelin (ET) level was significantly lower ( $p < 0.01$ ) after 15 days of acupuncture therapy. 17 Reduction in blood pressure mediated by changes in expression or activity of endothelial nitrous oxide synthase (eNOS). 18 Acupuncture-induced depressurization is mainly through lowering the peripheral resistance of small arteries, acupuncture could decrease high blood pressure as well as blood viscosity. 19

#### Patients and Methods:

Eighty-one subjects included in this study, their ages were (25- 55 years) mean age 42 years. They were divided into two groups, first group (30) control normotensive group and second group was (51) hypertensive patients. The patients were referred as out patients from Baghdad teaching hospital to the centre of Chinese medicine in Ghazy AL-Harery

Hospital. We received 93 patients from whom only (51) (37 male and 14 female) subjects complete ten sessions, all of them were with no history of alcohol ingestion nor drug history other than antihypertensive for some of them, the others (42) discontinued and most of them left from first or second session. The patients were received in the centre of Chinese medicine and after 5-10 minutes rest, then they lay down on bed in supine position in a comfortable situation. Explanation on the procedure for each of them was done, the blood pressure measurement was performed by mercurial sphygmomanometer before starting the session and after the end. Those who were already on antihypertensive drugs continue on their drugs to be checked daily with sessions and to decide whether to reduce the dose, stop the drug or continue to same drug and dose. The control group was selected as normotensive subjects, they were 30 subject (22 male and 8 female) and we used the same acupoints to compare the hypotensive effect of these points on normal subjects versus patients. Filliform disposable acupuncture needles were inserted in these points. The sites of insertion of needles were disinfected by iodine before insertion of the needle and after removal of needles. According to meridians and collaterals theory of traditional Chinese medicine we selected specific points that can be used to reduce the elevated blood pressure these, were Liver (liv) meridian on the third point (liv3), Large intestine (Li) meridian on the 11th point (LI11) and Governor (GV) meridian on the top of head also called DU channel on the 20th point 20. Each session continued for about 30 minutes at least twice weekly for five weeks and follow up three months after the last session to check the blood pressure during this period they did not take antihypertensive drug.

#### Results:

Table-1- shows the results of control group which included (22) male and (8) female there were no significant changes in all parameters except for the pulse rate which shows significant difference ( $p < 0.001$ )

**Table-1- parameters of control group (Mean  $\pm$  SD)**

Parameter	Pre (mean $\pm$ SD)	Post (mean $\pm$ SD)	P value
Heart rate BPM	76.17 $\pm$ 2.82	74.60 $\pm$ 1.89	<0.001
Systolic BP (mm Hg)	118.5 $\pm$ 4.76	117.33 $\pm$ 4.3	<0.006
Diastolic BP (mm Hg)	75.83 $\pm$ 4.93	75.33 $\pm$ 4.9	>0.184
Pulse pressure	42.67 $\pm$ 5.53	42 $\pm$ 6.24	>0.255
Mean Blood Pressure	33.17 $\pm$ 9.33	33.33 $\pm$ 10.37	>0.851

Pre=before acupuncture, post=after acupuncture, P significant at  $< 0.05$

Patients group consisted of (51) individuals (37) males and (14) females, from those 51 there were 39 got response i.e they became normotensive and this represent (76.47%) while the rest were still hypertensive (23.52%) but they showed significant change in all parameters after treatment. Table-2- shows the mean systolic blood pressure before acupuncture was  $165.49 \pm 12.8$  and after the end of the 10<sup>th</sup> session the result was  $133.33 \pm 14.7$  and the reduction continued after three months from the date of last session and it was  $126.03 \pm 8.1$ , showing significant changes ( $p < 0.001$ ). The mean diastolic blood pressure was  $100.39 \pm 2.6$  mmHg and it became  $84.31 \pm 7.8$  after the 10<sup>th</sup> session and continued in reduction after three months to show  $81.2 \pm 3.1$  so it was highly significant ( $p < 0.001$ ). The mean blood pressure was  $120.26 \pm 13$  after the 10<sup>th</sup> session it became  $99.22$  and continued in reduction after three months to  $96.32 \pm 4.4$  which shows high statistically significance ( $p < 0.001$ ). The heart rate showed mild increment at time of acupuncture, but after end of the session there was mild reduction and it continued in that level even after three months, the mean heart rate before acupuncture was (78) BPM and became (74.6) BPM after end of the 10<sup>th</sup> session while still continue nearly in its level after three months (74) BPM.

**Table-2- Descriptive statistics of patients group (Mean  $\pm$  SD)**

Parameter	Pre(mean $\pm$ SD)	Post 1(mean $\pm$ SD)	P value
Heart rate	78 $\pm$ 3.78	75.41 $\pm$ 2.75	< 0.001
Systolic BP mm Hg	165.49 $\pm$ 12.85	133.33 $\pm$ 14.75	< 0.001
Diastolic BP mm Hg	100.39 $\pm$ 2.61	84.31 $\pm$ 7.81	< 0.001
Pulse pressure	65.1 $\pm$ 13.28	49.02 $\pm$ 10.24	< 0.001
Mean Blood Pressure	120.26 $\pm$ 13.66	99.22 $\pm$ 13.69	< 0.001

Pre=before acupuncture, post1=after 10<sup>th</sup> session acupuncture, Pvalue significant at <0.05

Table-3- shows the patient group in follow up period three months after the last session

**Table-3- Descriptive statistics of patients group (Mean  $\pm$  SD)**

Parameter	Pre (Mean $\pm$ SD)	Post2 (Mean $\pm$ SD)	P value
Heart rate (BPM)	78.9 $\pm$ 3.11	74.9 $\pm$ 2.16	< 0.001
Systolic BP mm Hg	162.82 $\pm$ 11.51	126.0 $\pm$ 8.12	< 0.001
Diastolic BP mm Hg	100.26 $\pm$ 2.55	81.28 $\pm$ 3.18	< 0.001
Pulse pressure	62.56 $\pm$ 11.91	44.74 $\pm$ 6.68	< 0.001
Mean Blood Pressure	118.72 $\pm$ 15.14	96.32 $\pm$ 4.47	< 0.001

Pre=before acupuncture, post2=3months after acupuncture, Pvalue significant at <0.05

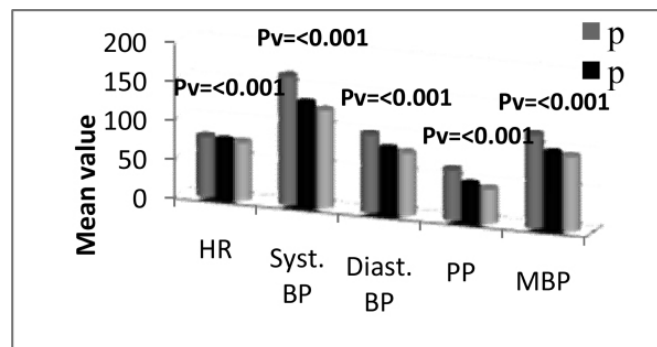
Table -4- shows a comparison between control and patients groups for mean difference in all parameters (the difference between the first readings and the last readings and we took the mean of the results and then we compared between the differences), the results of mean difference all were significant except for heart rate.

**Table-4- Comparison parameters of mean difference between control and patient groups (patient Vs. control)**

Type		Mean difference	St. ER	P value
Heart rate (pre Vs. post1) (BPM)	Patient	3.14	5.05	0.254
	control	1.98	2.86	
Systolic BP (Pre Vs. post1) mm Hg	Patient	19.29	7.59	< 0.001
	control	0.96	1.76	
Diastolic BP (Pre Vs. post1) mm Hg	Patient	16.03	7.31	< 0.001
	control	0.63	2.58	
Pulse pressure (Pre Vs. post1)	Patient	23.17	14.59	< 0.001
	control	1.54	7.54	
Mean Blood Pressure (Pre Vs. post1)	Patient	17.26	7.28	< 0.001
	control	- 0.64	13.68	

Pvalue significant at <0.05, St. ER=standard error.

Figure-1 below shows clearly the continuously reduction of high blood pressure and all other parameters throughout the period of acupuncture and the follow up after three months.



**Fig. 1: Study parameters among patients group before and after treatment**

Pre=before acupuncture, post1=end of 10<sup>th</sup> session, post2=3months after post1.

HR=heart rate, pp=pulse pressure, MBP=mean blood pressure

Pv=P value (Pvalue significant at <0.05).

#### Discussion:

Acupuncture is an ancient form of Chinese medicine. No drug is injected. The needles alone create the beneficial effects of acupuncture. According to Chinese conception

of the disease, all diseases occurred due to imbalance and the treatment is to return back to balance. The results of this study showed significant ( $P < 0.001$ ) decrease in blood pressure in patients group after the last session and continued to show reduction after 3 months. According to this study we did not see a significant correlation between the effect of acupuncture and duration of hypertension. The results of this study agrees with Zhang, Ng and Sau (2009) 21 where they showed significant reduction of systolic and diastolic blood pressure of their patients over five weeks of acupuncture needling in 30 minutes sessions. The points selected in this study agrees with those used by Yang (2010) 22 who reported that LI 11 and Liv 3 are effective pair points for hypertension and has long-term antihypertensive effect. An animal study by Wang et al in 2011 23 showed that rats having spontaneous hypertension (equal to primary hypertension in human being) stimulation liv3 acupoint can lower blood pressure through reducing level of endothelin1 in plasma and that lead to improving blood pressure. Xing et al (2011) 24 concluded that acupuncture is effective significantly on primary hypertension and the point selection according to syndrome differentiation can improve the efficacy, which is probably relevant with the reduction in the peripheral vascular resistance due to the improvements of microcirculatory state. Chen et al (2010) found that Acupuncture is superior to Diovan in relieving hypertension. 25 Acupuncture had no appreciable effect on the normal blood pressure in normal subjects. It may adjust "abnormal", but not "normal" blood pressure. 26 The effects of acupuncture on blood pressure and heart rate in hypertensive patients was decrease in both systolic and diastolic pressure. The decrease in blood pressure was accompanied by a fall in heart rate. 27 Chen and Ma (2003) 28 studied acupuncture effect and they concluded: the hypotensive and bradycardiac responses to acupuncture are modified by influences of L-arginine-derived NO synthesis in the gracile nucleus. They conclude that NO plays an important role in mediating the cardiovascular responses to acupuncture through gracile nucleus.

#### Conclusions:

Acupuncture on selected points has significant hypotensive effect in hypertensive patients immediately after end of sessions and in follow up period after three months. The antihypertensive effect of acupuncture is stable in the three months follow up period i.e. patient became physiologically stable. Acupuncture does not lower blood pressure in normotensive individuals.

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