

## A Comparison of Chinese Traditional and Western Medical Approaches for the Treatment of Mild Hypertension

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We compared the efficacy of Chinese traditional treatment for mild hypertension with that of a standard Western medical regimen in a group of 50 well-matched patients (24 allocated to Western medicine and 26 to Chinese traditional medicine) with mild hypertension (diastolic blood pressure 90–104 mmHg). Those receiving Western therapy were treated in a stepped-care fashion with dihydrochlorothiazide and atenolol. Those in the Chinese traditional therapy group received one of two mixtures of nine herbs and other ingredients, depending on symptoms at initial evaluation. Blood pressure dropped significantly in both groups after only a few days on therapy. After 19 days on treatment, the group receiving Western therapy had a fall in blood pressure from 168.2/96.3 mmHg to 137.3/76.7 mmHg ( $p < 0.01$ ), while those on Chinese traditional therapy fell from 168.2/95.9 mmHg to 146.4/80.5 mmHg ( $p < 0.01$ ). The fall in blood pressure was significantly greater, however, in those given Western therapy. The relief of existing symptoms or development of possible drug side effects was similar in both groups, except for nocturia, occurring more often in the group treated with Western therapy. We conclude that Western therapy is more effective in reducing blood pressure as compared with Chinese traditional therapy, but effective control of blood pressure in mild hypertensives is possible with either form of treatment.

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### INTRODUCTION

The effective treatment of hypertension is essential for preventing related complications, in particular coronary heart disease, stroke, congestive heart failure, and renal disease. Although these sequelae of hypertension have been on the decline in many Western nations over the past few decades [1], they have become increasingly important causes of morbidity and mortality in China [2], where the estimated prevalence rates of hypertension (diastolic blood pressure of 95 mmHg or higher) are 3 to 9 percent with an additional 4 percent having a diastolic blood pressure of between 90 and 95 mmHg [3]. Recent surveys of factory workers in China's Hunan province show the prevalence of hypertension (as defined by a diastolic blood pressure greater than or equal to 90 mmHg) to be approximately 7 percent, and that of the general population slightly higher [4]. Since 1950, the prevalence of hypertension throughout China has increased [5], though blood pressures in urban areas and in northern parts of China are higher than those in rural and southern regions [6].

Other risk factors for coronary disease, especially serum cholesterol [7] and cigarette smoking, have also increased dramatically over the past few years.

Although Western approaches to treating hypertension in China are becoming more popular, many medical practitioners, especially in rural areas, still use herbal preparations as the primary mode of treatment. It has previously been shown that drug therapy employing Western medicine is superior to Chinese traditional treatment [8] for moderate and severe hypertensives. But it remains to be shown whether traditional treatment may be as effective for mild hypertensives, who comprise a substantial proportion of the hypertensive population. If so, such treatment, which could have fewer side effects, might be used for those patients. Western treatment could be reserved for those whose hypertension is more severe.

In this report, we compare the efficacy and side-effect profile of a stepped-care Western medical regimen with a symptom-based Chinese traditional prescription in the treatment of patients with mild hypertension.

### MATERIALS AND METHODS

Thirteen hundred retired factory workers in the city of Changsha within Hunan province of the People's Republic of China were screened for hypertension. Three independent blood pressure readings at different times of the day or on different days were obtained by a group of trained physicians and nurses. An individual was considered hypertensive if two out of three readings were abnormal (diastolic blood pressure of 95 mmHg or greater or systolic blood pressure of 160 mmHg or greater). Ten percent (130) were found to be hypertensive, and 70 agreed to participate in the study. Of these, 64 were systematically allocated to either Western medical or Chinese traditional treatment, depending on whether the assigned screening number was odd or even [8]. Fifty of these patients had blood pressure levels in the mild hypertension range (diastolic blood pressure between 90–104 mmHg) after a four-day washout period to eliminate any effects of medications the subjects were currently taking (the most commonly used medication prior to recruitment was a mixture in capsule form of the herb *rauwolfia* alkaloid with a sedative and diuretic). These patients form the cohort studied in this report. Fourteen other patients (eight patients from group 1 and six patients from group 2) were excluded from the analysis because of not meeting the criteria for mild hypertension (diastolic blood pressure of 90–104 mmHg) at the measurement taking following the washout period (day 4).

The protocol for the Western treatment is shown in Table 1, and the protocol for the Chinese traditional treatment is described in Table 2. Those receiving Western treatment were put on a standard stepped-care regimen of dihydrochlorothiazide followed by atenolol, as is used at the Hypertension Clinic of the First Affiliated Hospital in Hunan. Those allocated to Chinese traditional (primarily herbal) treatment were given either prescription A or prescription B (there were approximately equal numbers of patients receiving each prescription), based on which category of symptoms they fit best. This assignment was made after discussion by a panel of three physicians trained in the use of Chinese traditional medicine. Symptom criteria for each of the prescriptions were provided by a panel of traditional medicine experts from the Beijing National Traditional Medicine Institute, as were suggestions for the specific traditional Chinese medicine mixtures, which represent the traditional ingredients of choice used to treat hypertension patients in China. The appropriate mixture of herbs and other ingredients was boiled in 500 ml of water for 30 minutes,

TABLE 1  
Drug Protocol for Western Therapy

Day 1–4 (washout period)		No therapy
Day 5–11		Dihydrochlorothiazide (25 mg twice daily)
Day 12–18	If DBP $\leq$ 90 mmHg	No change
	If DBP $>$ 90 mmHg or SBP $>$ 160 mmHg	Atenolol (25 mg three times daily added)
Day 19–24	If DBP $\leq$ 90 mmHg	No change
	If DBP $>$ 90 mmHg or SBP $>$ 160 mmHg	Double dosage of both drugs

DBP, diastolic blood pressure  
SBP, systolic blood pressure

as previously described [8], producing a liquor which the patient drank. Additional liquor produced by reboiling the same mixture in another 500 ml of water was also ingested by the patient. The mixture was given twice daily. The particular mixture given a patient receiving traditional treatment did not change; however, two additional ingredients, earthworm (*Lumbricus*) and achyranthis root (*Radix achyranthis bidentatae*) were added if normotensive levels were not achieved from the original mixture.

In both patient groups, a physical examination and laboratory tests, including an electrocardiogram, were done prior to day 1 of the study in the hospital serving the factory and at designated intervals in the clinic throughout the study. Blood pressure and pulse readings were taken the first day, the fourth day, the seventh day, the fourteenth day, and the twenty-third day, and, of three readings on each of these days, the latter two were averaged to obtain the recorded pressure. Each time, the readings were taken at 4:00 P.M. by three physicians in the medical outpatient clinic

TABLE 2  
Drug Protocol for Chinese Traditional Therapy

Day 1–4 (Washout period)	No therapy
Day 5–24	Active therapy of prescription A or B according to traditional diagnosis, depending on symptoms

Prescription A (*gyan yan kan*)

*Representative Symptoms:* Strong pulse, loud voice, easily irritated, constipation/dry stool, yellow urine, dry tongue with layer of yellow, and obesity

*Ingredients:* Oyster shell (*Concha ostreae*), magnetite (*Magnetitum*), earthworm (*Lumbricus*), rehmannia root (*Radix rehmanniae*), achyranthis root (*Radix achyranthis bidentatae*), grass-leaved sweet flag rhizome (*Rhizoma acori graminei*), prunella/self-heal spike (*Spica prunellae*), chrysanthemum (*Flos chrysanthemi*), and water-plantain tuber (*Rhizoma alismatis*)

Prescription B (*sing yin shu*)

*Representative Symptoms:* Rapid and thready pulse, loose stool, excessive urine, red tongue, and underweight

*Ingredients:* Siberian solomon seal rhizome (*Rhizoma polygonati*), lucid ligustrum fruit (*Fructus ligustri lucidi*), wolfberry fruit (*Fructus lycii*), eucommia bark (*Cortex eucommiae*), mulberry mistletoe (*Ramulus loranthi*), philodendron bark (*Cortex philodendron*), tetrandra root (*Radix stephaniae tetrandrae*), Chinese angelica root (*Radix angelicae sinensis*), and pueraria/kudzu vine root (*Radix puerariae*)

at the factory. All participants were fully ambulatory and were instructed not to modify their diets.

Baseline characteristics, including demographic, laboratory, and pre-treatment blood pressure and pulse readings were compared between treatment groups using the Student's *t*-test for unpaired samples. Differences between groups in blood pressure and heart rate changes from post-washout baseline (day 4) to days 7, 14, and 23, and serum potassium from day 4 to day 23 were assessed similarly. Analysis of covariance was used to adjust for the effects of age, sex, baseline blood pressure, and Quetelet index ( $\text{kg}/\text{m}^2$ ). A *p*-value of  $<0.05$  was considered statistically significant for differences in treatment efficacy. The Fisher's exact test and chi-square test of proportions were used to compare the frequency of symptoms individually and overall, respectively, between the two medication groups at the initial observation period (days 1–4) and at post-treatment (days 28–30).

## RESULTS

Fifty patients with mild hypertension after the four-day washout period completed the study. There were 24 in the Western medication group and 26 in the Chinese traditional medication group (of whom 11 received the *gyan yan kan* prescription and 15 the *sing yin shu* prescription). Of the 24 patients in the Western medicine group, secondary therapy of atenolol was given to seven patients (29 percent). Of the 26 patients in the Chinese traditional therapy group, nine (35 percent, all in the *sing yin shu* prescription group) had the two additional ingredients, earthworm (*Lumbricus*) and *Radix achyranthis bidentatae*, added to their initial prescription.

Table 3 compares the baseline characteristics (demographic, laboratory, physical examination, and pre-treatment blood pressure and pulse measurements) of the two treatment groups. No significant differences in any of these characteristics are demonstrated between the two groups.

Table 4 shows the absolute values of systolic and diastolic blood pressure and pulse rate at the end of washout (day 4) and during treatment (day 7, day 14, and day 23) for both of the treatment groups. The mean changes from the baseline (at day 4) are shown in parentheses. The corresponding absolute values and mean changes of serum potassium from day 4 to day 23 are also shown. Also indicated are whether the changes from baseline to each of the three treatment recordings are significant within each treatment group, as well as whether the changes from baseline to each treatment period differ between groups (e.g., whether the efficacy of treatments differed by days 7, 14, and 23).

Clinically important decreases in both systolic and diastolic blood pressure are seen in those receiving either Western medical or traditional Chinese therapy. For both groups, systolic and diastolic blood pressure dropped significantly ( $p < 0.01$ ) from post-washout baseline at four days to each of the measurements on treatment (seven days, 14 days, and 23 days). Although the traditional medicine group was effective in reducing blood pressure to normotensive levels (mean systolic/diastolic blood pressure of 146.4/80.5 mmHg by the twenty-third day), significantly greater reductions in both systolic and diastolic blood pressure are seen in the Western stepped-care medication group by both the fourteenth and the twenty-third day. By the twenty-third day, systolic blood pressure in the Western group had dropped an average of 30.9 mmHg, compared to 21.8 mmHg in the herbal group ( $p = 0.05$ ). Corresponding drops in diastolic pressure were 19.7 mmHg and 15.4 mmHg,

TABLE 3  
Baseline Characteristics:  
Mean (SD) or Percentage, by Group  
( $p < 0.05$  comparing means or proportions between groups)

	Western Medicine (Group 1) ( $n = 24$ )	Herbal Medicine (Group 2) ( $n = 26$ )
% Male	42 ( $n = 10$ )	46 ( $n = 12$ )
Age (years)	62.5 $\pm$ 7.9	64.0 $\pm$ 9.0
Weight (kg)	57.7 $\pm$ 6.4	55.8 $\pm$ 7.9
Height (cm)	161.9 $\pm$ 9.0	163.5 $\pm$ 9.0
Serum K <sup>+</sup> (mEq/L) (day 1)	4.12 $\pm$ 0.44	3.98 $\pm$ 0.50
Serum K <sup>+</sup> (mEq/L) (day 4)	3.90 $\pm$ 0.35	3.94 $\pm$ 0.37
BUN (mg/dl)	14.9 $\pm$ 4.2	14.7 $\pm$ 4.1
No. with > 2+ proteinuria	2	2
No. with definite left ventricular hypertrophy by ECG	1	2
No. with abnormal sinus tachycardia changes	4	4
Day 1 systolic blood pressure (mmHg)	174.4 $\pm$ 16.5	168.5 $\pm$ 15.4
Day 1 diastolic blood pressure (mmHg)	98.1 $\pm$ 7.7	96.6 $\pm$ 9.5
Day 1 pulse (beats/minute)	76.9 $\pm$ 7.9	77.0 $\pm$ 10.2
Day 4 systolic blood pressure (mmHg)	168.2 $\pm$ 16.2	168.2 $\pm$ 17.6
Day 4 diastolic blood pressure (mmHg)	96.3 $\pm$ 5.4	95.9 $\pm$ 6.0
Day 4 pulse (beats/minute)	76.7 $\pm$ 8.9	74.8 $\pm$ 8.0

respectively ( $p < 0.05$ ). Except for a rise in heart rate from the seventh to the fourteenth day in the Western medicine group, there were no significant on-treatment changes in heart rate within or between groups. A highly significant fall (from 4.12 to 3.90 mEq/L,  $p < 0.01$ ) in serum potassium during the 19-day treatment period occurred in the Western medicine group; serum potassium levels stayed essentially the same in the Chinese traditional therapy group, however.

Results from the analysis of covariance procedures (Table 5) done to compare the efficacy of treatment group in reducing systolic blood pressure and diastolic blood pressure from the post-washout baseline (day 4) to each of the treatment period recordings (day 7, day 14, and day 23) were generally consistent with the initial results shown above. After accounting for the effects of age, sex, baseline blood pressure (systolic or diastolic at day 4), and Quetelet index ( $\text{kg}/\text{m}^2$ ), the superior efficacy of Western treatment is statistically significant for analyses predicting changes in systolic blood pressure from baseline to days 7, 14, and 23, and for diastolic blood pressure from baseline to days 14 and 23. Independent of treatment effects, baseline systolic blood pressure (at day 4), but not baseline diastolic blood pressure, was significantly correlated ( $p < 0.01$ ) with subsequent changes in blood pressure by day 7, day 14, and day 23. There was a weak relationship ( $p < 0.10$ ) of age with subsequent changes in systolic blood pressure by day 7 and changes in diastolic blood pressure by day 23. No consistent effects of sex or Quetelet index on response to treatment were noted.

The number of patients developing each of 14 adverse symptoms within each of the treatment groups during the treatment period, and the number of patients

TABLE 4  
Treatment Changes from Baseline and Between Groups, by Treatment Period

	Group	Baseline	Treatment		
		(Day 4)	(Day 7)	(Day 14)	(Day 23)
Systolic Blood Pressure (mmHg)	Western (Change from day 4) (n = 24)	168.2	151.9 (-16.3) **	146.1 (-22.1) **	137.3 (-30.9) **
	Herbal (Change from day 4) (n = 26)	168.2	159.7 (-8.5) p = 0.01	157.4 (-10.8) **	146.4 (-21.8) **
Significance of <i>t</i> -test comparing blood pressure change between Western/Herbal treatments			N.S.	*	p = 0.05
Diastolic Blood Pressure (mmHg)	Western (Change from day 4) (n = 24)	96.3	86.5 (-9.8) **	80.0 (-16.3) **	76.7 (-19.6) **
	Herbal (Change from day 4) (n = 26)	95.9	88.3 (-7.6) **	85.2 (-10.7) **	80.5 (-15.4) **
Significance of <i>t</i> -test comparing blood pressure change between Western/Herbal treatments			N.S.	*	*
Heart Rate (beats/minute)	Western (Change from day 4) (n = 24)	76.7	74.9 (-1.8) N.S.	82.1 (5.4) *	73.6 (-3.1) N.S.
	Herbal (Change from day 4) (n = 26)	74.8	75.2 (0.4) N.S.	75.8 (1.0) N.S.	74.4 (-0.4) N.S.
Significance of <i>t</i> -test comparing heart rate change between groups			N.S.	N.S.	N.S.
Serum Potassium (K <sup>+</sup> ) (mEq/l)	Western (Change from day 4) (n = 24)	4.12	—	—	3.90 (-0.22) **
	Herbal (Change from day 4) (n = 26)	3.98	—	—	3.94 (-0.04) N.S.
Significance of <i>t</i> -test comparing serum potassium change between groups					N.S.

\**p* < 0.05

\*\**p* < 0.01

Compared with level at day 4, or comparing changes in blood pressure from baseline, between groups, by the indicated day of treatment

N.S., not significant

TABLE 5  
Multivariable Analysis of Treatment Group Effect on Blood Pressure Change by Period, Adjusting for Baseline Blood Pressure, Age, Sex, and Quetelet Index

	Change from Baseline (Days) to (F statistics)		
	Day 7	Day 14	Day 23
	Systolic Blood Pressure (SBP)		
Treatment Group	4.17*	6.88*	4.69*
Baseline SBP	8.24**	12.23**	17.66**
Age	3.27	2.69	1.34
Sex	0.06	1.15	0.004
Quetelet Index (weight/height <sup>2</sup> )	2.00	1.24	0.15
	Diastolic Blood Pressure (DBP)		
Treatment Group	2.25	6.68*	4.81*
Baseline DBP	0.01	2.19	0.08
Age	0.02	1.56	3.93
Sex	0.01	0.85	0.61
Quetelet Index (weight/height <sup>2</sup> )	1.85	0.39	0.11

\* $p < 0.05$

\*\* $p < 0.01$  for the test of a treatment group effect on change in systolic or diastolic blood pressure or effect of baseline blood pressure on change in blood pressure for indicated period

relieved of symptoms during this period are shown in Table 6. Comparisons of proportions of individuals with each symptom between groups by the Fisher's exact test demonstrated only the incidence of nocturia to be significantly ( $p < 0.05$ ) more common among the group receiving Western medication during the initial observation period (days 1–4). No other differences in the relief or incidence of symptoms were noted, although the prevalence of most side effects appeared to decrease in both groups.

## DISCUSSION

The results of this investigation demonstrate that either a stepped-care regimen of Western therapy or traditional Chinese treatment are effective in reducing blood pressure to normotensive levels in those with mild hypertension. Western therapy, however, is shown to be significantly more efficacious compared to traditional Chinese therapy, resulting in greater decreases in both systolic and diastolic blood pressure after the first week on treatment. Furthermore, both regimens were equally well tolerated and appeared to reduce patient complaints. Only nocturia was more common in the Western group (who received the thiazide diuretic).

Although neither blinded randomization nor placebos were used in this study, it is felt that the systematic allocation, alternating assignment to either Western or Chinese traditional treatment groups prior to blood pressure measurement, did provide for comparable study groups. Both groups, in fact, were quite similar in all baseline characteristics. Of those originally eligible to enter the study, no patient refused treatment because of assignment to a specific treatment group. Among those receiving traditional treatment, although the mechanisms of action are felt to be different for prescriptions A and B, no differences in efficacy were found. Choice of

TABLE 6  
Incidence and Relief of Symptoms During Treatment Period

	"Incidence"		Relief	
	Western Medicine (Group 1) (n = 24)	Chinese Traditional (Group 2) (n = 26)	Western Medicine (Group 1) (n = 24)	Chinese Traditional (Group 2) (n = 26)
Stuffiness	0	0	2 (29)	1 (14)
Palpitation	0	2 (10)	3 (50)	1 (17)
Shortness of breath	0	0	0	2 (33)
Edema	0	0	0	3 (75)
Nocturia	*4 (36)	0	2 (15)	2 (13)
Headache	0	0	3 (25)	6 (50)
Dizziness	0	0	1 (8)	1 (7)
Sleeplessness	0	0	3 (30)	3 (23)
Blurred vision	2 (14)	0	0	1 (14)
Sexual dysfunction	0	1 (4)	0	0
Nightmares	0	2 (11)	1 (14)	2 (25)
Weakness of limbs	3 (15)	2 (8)	0	0
Muscle cramping	0	1 (5)	1 (25)	1 (17)
Rash	0	0	3 (43)	2 (50)

\*Number of cases with symptoms developing or being relieved during the treatment period; numbers in parentheses indicate the percentage of cases without symptom at baseline who developed the symptom during the treatment period, or those with the symptom at baseline who experienced relief of the symptom during the treatment period.

\* $p < 0.05$  compared to incidence in group 2

the prescriptions to use was based on the particular diagnosis and presenting symptoms, consistent with Chinese traditional teaching. The different patient characteristics used in assigning a particular prescription, however, preclude making conclusions as to which is a more effective traditional mixture for the representative hypertensive patient.

The results of this investigation stand in dramatic contrast to our previously reported comparison of the efficacy of Western and Chinese therapy [8]. In that study, a younger population with more end-organ damage and more severe hypertension (a diastolic blood pressure at entry of 105 mmHg to 129 mmHg was used) was seen on an inpatient basis; we found that Chinese traditional medicine was totally ineffective, while Western treatment was successful. The reasons are not clear. Perhaps Chinese traditional medicines may not work in patients with accompanying clinical problems or more severe hypertension. Another possible reason why Chinese traditional medicine worked in this present study and not in our earlier one includes the fact that the medications used were selected on the basis of which symptom-based diagnosis (*gyan yan kan* or *sing yin shu*) best fit the given patient allocated to the traditional medicine group. In our earlier protocol, different herbs were used and all patients received the same prescription. The regimen used in the previous report [8] and that used here was, however, recommended by specialists in Chinese traditional medicine [9]. The most effective traditional agents alone include the tetrandra root (*Radix stephaniae tetrandrae*), eucommia bark (*Cortex eucommiae*), prunella/self-heal spike (*Spica prunellae*), earthworm (*Lumbricus*), and Chinese angelica root (*Radix angelicae sinensis*); however, it is unclear which agents in



combination are most effective. Finally, there is the possibility that those allocated to traditional therapy may have used other medications that were available to them (Chinese persons often borrow medication from one another). We feel that this situation is unlikely, however, since both heart rate and serum potassium levels were similar at the start and the conclusion of the traditional treatment regimen. Also, our first study was done in the hospital, while this study was performed on an ambulatory population.

We have again shown that Western medication reduces blood pressure substantially more than Chinese traditional regimens. This study does demonstrate, however, that specific herbal preparations can effectively lower blood pressure in mild hypertensives to normotensive levels with little difference in the incidence of side effects, compared to Western drug therapy. Since many Chinese prefer to use herbal preparations, it is now clear that these can effectively be used to treat individuals with mild hypertension, although cost and convenience considerations must be weighed when selecting what is the best treatment for a particular individual.

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