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The effect of a modified classic herbal formula, *Bupleurum* and dragon bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*), on stress: a small sample non- randomized human clinical trial

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Abstract

Contemporary society has seen stress reaching epidemic proportions. Pharmaceutical drugs used to treat stress, although effective, run the risk of physical dependence and addiction, prompting stress sufferers to seek other therapies. Chinese medicine, and in particular herbal medicine, presents a reasonable and effective treatment for stress management. Human clinical trials of Chinese herbal formulas are sorely lacking in Western medical literature. The present small sample, non-randomized clinical trial was conducted to test the efficacy of the herbal formula *Bupleurum and Dragon Bone (Chai Hu Long Gu Mu Li Tang Jia Jian)* in lowering participant scores on the standardized Perceived Stress Scale. The result of this clinical trial yielded a highly significant p-value of .001. The results were discussed in terms of theory and practice.

Keywords: Herbal medicines, stress, *Bupleurum* and Dragon Bone, Chinese medicine, stress measures.

1. Introduction

The World Health Organization (WHO) has declared that stress is the epidemic of the 21st century, and the International Labor Organization (ILO) has referred to stress as a global epidemic. According to various estimates, the cost of stress on the American economy falls somewhere between 200 and 300 billion dollars a year in lost productivity, absenteeism and illness [1]. It is not possible to avoid all forms of stress in our lives, nor should we want to, because they can be natural elements of survival. But, the stress of today is not the stress of our forefathers and ancestors. There was a time in the evolutionary history of the human species when the stress response was triggered more often by the threat of real physical harm by predatory animals or hostile enemies, in those scenarios, the “fight or flight” response developed and proved to be a life-saving mechanism.

The pharmaceutical industry was one of the first to address the impact of the stress epidemic as early as 1954 with the discovery of benzodiazepines by Leo Sternbach. This class of drugs that contain common names such as Xanax, Valium, Klonopin, Ativan and Tessalon, first entered the market in the 1960's and gained wide acceptance from physicians and the general population. By the mid-1970s an astounding 8000 tons of these medications were sold every year [2]. As an indication of the extent that patients were seeking help for stress and anxiety, IMS Institute for Healthcare Informatics [3] listed benzodiazepines as number ten on the list of most commonly prescribed drugs beginning in 2005 with 76.7 million prescriptions and maintaining that position through 2009 when an amazing 87.9 million prescriptions were counted. The use of these medications is not without cost and the potential for physical and/or psychological addiction has been observed. It is the opinion of some researchers that the extensive prescribing of this class of drugs constitutes medically sanctioned addiction that will impact healthcare both economically and qualitatively [4].

The risk of side effects and/or addiction of many psychotropic drugs on the market are causing more and more people to seek complementary and alternative medicine (CAM) to help reduce and manage the perceived stress in their lives. Within the broad category of CAM, Classical Chinese medicine, that includes acupuncture and herbal medicine, has become a popular and widely accepted modality for the treatment of stress.

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2. Bupleurum and Dragon Bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*)

The formula Bupleurum and Dragon Bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*) was chosen as the focus of the current study because of the widely accepted use of the formula to calm the shen. Today, the formula is used for more internally generated disharmonies of the Liver-Gall Bladder system rather than externally-contracted influences. The western concept of psychological stress translates to many of the signs and symptoms most associated with Liver depression Qi Stagnation and Liver Fire in Classical Chinese medicine [5]. Although highly unlikely, taking this herbal formula may result in the following side effects; dry mouth, loose stools, headache, bloating, cramps, dizziness, light-headedness, feeling warmer than usual and nausea. There is also mention that this formula may reduce the effects of antibiotics.

The majority of research conducted on Bupleurum and Dragon Bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*) has been in China and Japan. In Japan, the formula is known as *Saiko-ka-ryukotsu-borei-to* (SKRBT). In 1994 a study was conducted in Japan using the SKRBT formula to study its effect on serum corticosterone levels in mice. The mice were subjected to several different stressors that included immobilization, forced-swim, electric shock and psychological stress. Corticosterone is a glucocorticoid produced by rodents that is similar to cortisol in humans. The researchers found that the effect of SKRBT on serum corticosterone in stress models depends more on psychological stress than on physical stress. In the psychologically stressed mice, the formula exhibited an anti-stress effect that was dose-dependent. This action may be related to the concentration of the formula in the blood [6].

There are ample studies that implicate stress in hypertension and atherosclerosis. A 2013 study of the effect of the administration of SKRBT to hypertensive rats showed that the formula increased the number of endothelial progenitor cells (EPC) that function to repair vascular injuries. The study also showed that there was a reduction in levels of IL-6, a pro-inflammatory cytokine that is also involved in many disease conditions. The researchers concluded that the administration of SKRBT exhibited a protective effect on the cardiovascular system by increasing the function of EPCs, coupled with an anti-oxidant effect that may influence the link between chronic inflammatory conditions and cardiovascular disease [7].

There has been considerable research and theory generated regarding the psychological and physiological aspects of stress. For the most part the scientific method engaged in prior research studies can be described as reductionist. Organ systems like the cardiovascular or immune systems are studied in isolation and not in an integrated manner that considers the system in relation to the whole organism. The primary constructs of Chinese medicine do not perceive the body and mind in a reductionist manner. A central pillar of Eastern medical thought is that the mind and body form a continuum, and there is no distinction in the functioning of either. In treatment, the implication is that there is no difference in the way diseases of the mind are treated from those of the body [8-14]. The herbal formula used in this clinical trial functions according to Chinese medical principles. The current study was designed to fill the existing gap in the literature regarding the possible impact that the formula Bupleurum and Dragon Bone has on stress.

3. Purpose

The purpose of this clinical trial is to investigate if a one month administration of the modified herbal formula named Bupleurum and Dragon Bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*), would result in the participants in the trial achieving lower scores on the Perceived Stress Scale compared with baseline scores reported before the administration of the herbal formula.

4. Method

The current study was carried out as a small sample non-randomized clinical trial design to explore the impact of a proprietary modified herbal formula, Bupleurum and Dragon Bone (*Chai Hu Long Gu Mu Li Tang Jia Jian*), on perceived stress. The design of this research project included a pre-intervention measurement, an intervention, and a post-intervention measurement. In addition to these measurements, demographic information was gathered to explore the possible correlation of these variables on the Perceived Stress Scale Scores.

4.1 The Bupleurum and Dragon Bone Formula

The formula used in this clinical trial was manufactured by Jing Herbs, located at 533 South Los Angeles Street, Suite 502, Los Angeles, California, 90013, jingherbs.com. The Lot number was 1160612 with an expiration, June 2015. The exact composition of the formula is as follows:

- Bupleurum Chinese (*Chai Hu*) root 67.5 mg
- Prepared Pinellia ternate (*Ban Xia*) rhizome 54.00 mg
- Zingiber officinale (fresh ginger) (*Sheng Jiang*) rhizome 38.25 mg
- Zizyphus jujube (*Da Zao*) (Red date) fruit 38.25 mg
- Codonopsis pilosula (*Dang Shen*) root 38.25 mg
- Os draconis (*Long Gu*) (Dragon bone) 36.00 mg
- Concha ostreae (*Mu Li*) (Oyster shell) 36.00 mg
- Coptis chinensis (*Huang Lian*) rhizome 36.00 mg
- Cinnamon cassia (*Gui Zhi*) twig 22.50 mg
- Cinnamon cassia (*Rou Gui*) bark 22.50 mg
- Poria cocos sclerotium (*Fu Ling*) 22.50 mg
- Poria paradisis (*Fu Shen*) (spirit Poria) 22.50 mg
- Rheum officinale (*Da Huang*) rhizome 15.75 mg
- Microcrystalline cellulose (Inactive ingredient) 50.00 mg

In this formula, Radix Ginseng (*Ren Shen*) has been removed and Radix *Codonopsis pilosula* (*Dang Shen*) has been substituted due to its more neutral temperature and its equal ability to strengthen the middle *jiao*. The addition of Cinnamon cassia bark is to warm the spleen and encourage the production of qi and blood. Although Poria cocos (*Fu Ling*) is a normal ingredient in the formula, in this composition, Poria paradisis (*Fu Shen*) is added because of its stronger shen calming influence. Scutellaria (*Huang Qin*) was eliminated and Coptis (*Huang Lian*) included because it enters the Liver and Scutellaria (*Huang Qin*) does not. One of the herbs in this formula, namely Prepared Pinellia ternate (*Ban Xia*) has a toxicity warning in its raw form, as you can see, the prepared form is used in this formula, and the presence of Zingiber officinale (*Sheng Jiang*) insures that any potential toxicity is neutralized. No other herbs in the formula carry toxicity warnings.

For the clinical trial, the herbal formula was dispensed in 90

capsule bottles. Each capsule contained 450 grams of active ingredients and 50 grams of inactive microcrystalline cellulose. The formula was a 10:1 extract, meaning that 10 pounds of raw herbs were used to make 1 gallon of liquid, the liquid was then dried to an extract powder. Each participant in the study was given 2 bottles for a total of 180 capsules. Participants were instructed to take 2 doses per day, morning and evening, consisting of 3 capsules each. Each dose delivered 1,359 grams of the active ingredients and 150 grams of the inactive ingredients. The dosing schedule was not modified according to differences in body weight.

The current study was carried out consistent with current Federal guidelines for the ethical treatment of human subjects. The proposal for the current research was reviewed and approved by the Yo San University Institutional Review Board (IRB).

4.2 Sample

The twenty participants in this research were solicited from the general population. The researcher conducted two rounds of recruitment. Inclusion criteria were as follows: male or female, between the ages of 20 and 80, must have either completed high school or possess a GED, must possess the ability to read and understand the study parameters, must self-identify as suffering from stress and must demonstrate a willingness and capacity to follow through with study directions and activities.

The exclusion criteria were as follows: individuals who were receiving acupuncture treatments, pregnant and nursing mothers, individuals who showed any indication of cognitive disorders, psychoses or severe specific anxiety or psychological conditions (e.g. bi-polar/ phobias/ obsessive/compulsive, etc.), individuals taking an herbal formula for stress, individuals who had a history of taking the herbal formula Bupleurum and Dragon Bone, individuals taking pharmaceutical drugs for high or low blood pressure, depression, anxiety or insomnia, individuals taking anti-psychotic or anti-seizure pharmaceutical drugs, and individuals from "protected populations."

4.3 Instruments

The first instrument used in the research was the advertisement text placed in the *Santa Monica Mirror*, *The Argonaut*, *UCLA Daily Bruin* and *Blue Pacific*. The purpose of this advertisement was to recruit potential participants in the clinical trial.

The second instrument employed was the Pre-Screening Telephone Interview. At the top of the questionnaire the researcher logged the date and time of the interview, and then asked the questions covering all the inclusion and exclusion criteria. The prospective participant answered each question with a yes or no answer, and the researcher noted the answer on the interview sheet. At the conclusion of the interview, the researcher informed the prospective participant if she/he had met the inclusion and exclusion criteria to be eligible to participate in the research study. The prospective participants were informed immediately if they were eligible to participate.

The third instrument consisted of an Oral Presentation. This instrument was read to the participants at the beginning of the data collection session introducing the researcher and giving the participants specific instructions as the procedures and order for completing each element of the data gathering.

Specific instructions were necessary to insure who the data integrity was maintained, and that the researcher did not see any data results that contained identifying information of the participants. All forms were sealed in an envelope and were given to the acupuncturist on site who was doing the tongue and pulse diagnosis. All data was first given to current researcher's advisor, de-identified, and then transmitted to the current researcher for analysis.

The fourth instrument used was the Waiver of Liability and Hold Harmless agreement. Because this clinical trial included an herbal formula that was to be ingested, it was necessary to inform the participants that they would assume all responsibility for any potential harm that was possible from ingesting the herbal formula. This instrument released the researcher, Yo San University, the Board of Directors and any and all employees from any litigation or monetary compensation as a result of injury or harm that may have occurred from taking the herbal formula.

The fifth instrument was the Informed Consent. This form described in clear language who the researcher was and all contact information, the purpose of the research, the procedures, possible risks and benefits, and confidentiality measures. The participants were also informed of their rights as participants and who to contact if they had any further questions as to any aspects of the research or their rights. The Informed Consent also included a disclaimer as to limits of liability.

The sixth instrument presented was the Life Questionnaire. This document was used to gather demographic background information on the participants. This data was not used in the statistical analysis to answer the research question but was used incidentally to see possible correlations and perhaps form future hypotheses.

The seventh instrument employed was the 14 item Perceived Stress Scale (PSS).^[15] Responses for each item of the scale could be answered from 0 to 4, with 0 corresponding to Never, 1 to Almost Never, 2 to Sometimes, 3 to Fairly Often and 4 to Very Often. The scale is used to assess the degree to which the participants evaluated their lives as being stressful during the preceding month. Items were not tied to any particular event and were sensitive to the non-occurrence of events as well as life circumstances. Scores of the PSS-14 were obtained by reversing the scores of the seven positive items on the scale.

The eighth instrument was the Daily Dosing Log. The participants were asked to take the herbal formula twice each day. The log simply listed day 1 through day 30. Each day had an A.M. and P.M. designation that the participants were to place a checkmark on, or any other indication that they had taken the daily dose. The participants were informed that they could include anecdotal comments for each day if they were so inclined. The actual number of days the participants took the formula was 29.

The final instrument employed was a Tongue and Pulse chart. A licensed acupuncturist was on site to conduct a tongue and pulse diagnosis for each participant at the end of the data gathering session and before they began taking the herbal formula. The purpose for gathering this information was to take a baseline reading before the herbal formula was administered and compare the tongue and pulse at the end of the trial period. Further information regarding any of the instruments used in this study can be obtained by contacting the author.

4.4 Data Collection Procedures

The data collection process began as soon as 20 eligible participants were approved, after having been qualified through the Pre-Screening Questionnaire. On the day of the data collection, the participants arrived at the designated space at the Yo San University campus and were greeted by the researcher. The participants were asked to present a form of identification so it could be compared to the list of approved participants. Once identity had been established, a numerically de-identified packet containing Waiver of Liability and Hold Harmless Agreement, the Informed Consent, the Life Questionnaire, the Perceived Stress Scale, and an empty and unsealed brown manila envelope was given to each participant. Each numbered packet was matched with the name of the participant receiving it. The researcher used only the numerical and de-identified material from then on.

The participants were then instructed to proceed to a licensed acupuncturist, who was present, to have a tongue and pulse diagnosis according to the principles of Chinese medicine. The acupuncturist listed the results for each participant according to the de-identified numeric on the set of documents. The researcher read through the Informed Consent, after finishing, he asked if there were any questions. Once all, if any, questions were addressed, the participants were instructed to sign and date the Waiver of Liability and Hold Harmless Agreement and Informed Consent. The researcher verified that all forms were signed by visual confirmation.

All participants then completed the Life Questionnaire and the Perceived Stress Scale. Upon completion of the questionnaires, the participants placed the documents into the manila envelope provided and proceeded to the licensed acupuncturist on site. The acupuncturist listed the results of the tongue and pulse on the forms provided to the participants. Each participant then proceeded to the researcher to receive the herbal formula and the Daily Dosing Log. Once the participants received these items, they had completed the first session of the research and were free to leave.

At the end of the one month clinical trial period, the participants returned to the Yo San University campus. The participants were once again identified against a master list of the qualified sample. The participants were given a manila envelope that had been de-identified and carried only a numeric identifier. The participants once again completed the 14 item Perceived Stress Scale and after completing, deposited it and the Daily Dosing Log into the manila envelope and took the envelope to the acupuncturist on site. A tongue and pulse diagnosis was then performed by the acupuncturist. At the end of the tongue and pulse diagnosis, the participants placed the Perceived Stress Scale, Daily Dosing Log and Tongue and Pulse sheet into the manila envelope and sealed the envelope and handed it to the acupuncturist. The participants then proceed to the researcher and were given the honorarium for their participation.

The data were collected from the participants using the Perceived Stress Scale developed by Cohen, Karmack & Mermelstein^[15]. The Perceived Stress Scale is the most widely used psychological instrument for measuring the perception of stress. The questions are of a general nature and are relatively free of content specific to any sub-group. The reliability and validity of the 14 item Perceived Stress

Scale were investigated by Cohen *et al.*^[15] through three attempts: two in college students and one in a community smoking-cessation program. Cronbach's alpha measures of internal consistency for the three samples were 0.84, 0.85, and 0.86 respectively.

4.5 Data Analysis

The clinical trial was conducted and the data collected to answer the research question: Does a modified proprietary herbal formula *Bupleurum* and *Dragon Bone* (*Jia Wei Chai Hu Long Gu Mu Li Tang Jia Jian*) reduce stress? The data obtained from the two key measurement instruments namely, the 14 Item Perceived Stress Scale and the Life Questionnaire were analyzed pre and post-treatment. Other analyses were performed on the demographic information obtained from the Life Questionnaire. The Perceived Stress Scale is one of the most common metrics used in relation to stress theory; the Life Questionnaire was composed by the researcher to gather common demographic data and it has no reliability or validity values attached to it.

The data from the Perceived Stress Scale were used to answer the research question. The remainder of the data from the Life Questionnaire was used to make inferences, investigate correlations and, in the future, form new hypotheses for further study. The Perceived Stress Scale was designed for samples with at least a junior high school education, for the purposes of this study one of the inclusion criteria was a high school education or GED. The items on this scale are easy to understand and the response alternatives are simple to grasp. The questions are quite general in nature and free of content specific to any sub population group. Analysis of the data generated from the Perceived Stress Scale required reversal ("coding") of the scores on several items as per the directions specific to that instrument. The next analysis was performed to determine the central tendency of the scores. The mean, median, range and standard deviation for all scores from the participant sample were computed. Comparisons were made between the pre and post intervention scores. After the data were compiled a t-test was performed to ascertain the statistical significance of the hypothesis.

5. Results

The primary main focus of this clinical trial was to determine the effects of a modified and proprietary classic herbal formula known as *Bupleurum* and *Dragon Bone* (*Chai Hu Long Gu Mu Li Tang Jia Jian*) on the test scores achieved by a sample of twenty participants taking the fourteen item Perceived Stress Scale. The clinical trial hypothesis was that the scores achieved on the Perceived Stress Scale would be lower after taking the herbal formula for a period of one month, than the scores achieved prior to taking the herbal formula. This clinical trial consisted of the participation of twenty human subjects from a possible pool of thirty eligible participants who were pre-screened in a telephone or in-person interview where inclusion and exclusion criteria were met.

5.1 Age

The trial population consisted of 20 participants, the median age was 53, the mean age was 52.8, the standard deviation was 13.3, and the range of ages was 27 to 76. See Table 1 below.

Table 1: Participant Age

Variable	N	Mean	SD	Median	Minimum	Maximum
Age	20	52.8	13.3	53	27	76

Participant ages were further arranged into quartile groups as follows: 27-45, 46-52, 54-62 and 64-76. See Table 2 below.

Table 2: Age Groups

Variable		N	Percent
	27-45	5	25.0
	46-52	5	25.0
<i>Age Groups</i>	54-62	5	25.0
	64-76	5	25.0
Total		20	100.0

An ANOVA or analysis of variance of the pre and post change in scores on the Perceived Stress Scale comparing the four age groups in Table 2 above, was not significant ($F(3,16)= 1.97, p= .159$). As displayed in Table X below, the youngest age group and middle age group, those aged 54 to 62, showed greater average decreases in perceived stress, -13.6 and -12.6 respectively compared to the second youngest and oldest age groups with average decreases of -5.6 and -3.0 respectively. See Table 3 below.

Table 3: ANOVA

Age Group	N	Mean	SD	F	p Value
27-45	5	-13.6	9.1	1.97	0.159
46-52	5	-5.6	9.3		
54-62	5	-12.6	5.5		
64-76	5	-3.0	8.6		
Total	20	-8.7	8.9		

5.2 Gender

The participant population consisted of 15 females and 5 males. See Table 4 below.

Table 4: Gender

Variable		Frequency	Percent
Gender			
	Female	15	75.0
	Male	5	25.0
Totals		20	100.0

5.3 Ethnicity

Participants could choose from the categories of African-American, Caucasian, Hispanic or Other. One participant, who chose the “Other” category, identified as Asian and has been designated as such. Another participant choosing

“Other” self- identified as Caucasian/Latin and has been designated as such. A third choosing “Other” did not specify a particular ethnic background and has been identified as “Other”. See Table 5 below.

Table 5: Ethnicity

Variable		Frequency	Percent
Ethnicity			
	African-American	2	
	Caucasian	14	
	Hispanic	1	
	Asian	1	
	Caucasian/Latin	1	
	Other	1	
Totals		20	100.0

5.4 Education

Of the 20 participants, 9 had completed graduate studies, 12 had completed college studies and only 2 had gone no higher than a high-school education. See Table 6 below.

Table 6: Education

Variable		Frequency	Percent
Education			
	High School	2	10.0
	College	12	60.0
	Graduate School	6	30.0
Totals		20	100.0

5.5 Military Service

Of the total population of participants, 2 identified as having performed military service and 18 identified as having not performed any military service. See Table 7 below.

Table 7: Military Service

Variable	Frequency	Percent
Military Service		
Yes	2	10.0
No	18	90.0
	20	100.0

5.6 Occupation

The 20 participants were requested to specify their occupations, the breakdown is as follows: 1 Actress, 2 Acupuncturists, 1 Administrative Assistant, 1 Artist, 1 Construction Worker, 1 Counselor, 1 Film Producer, 1 Homemaker, 1 Paralegal, 1 Real Estate Agent, 3 Retirees, 2 Self-employed, 3 Teachers and 1 Travel Agent. See Table 8 below.

Table 8: Occupation

Variable	Frequency	Percent
Actress	1	5.0
Acupuncturist	2	10.0
Adm. Asst.	1	5.0
Artist	1	5.0
Construction	1	5.0
Counselor	1	5.0
Film Production	1	5.0
Homemaker	1	5.0
Paralegal	1	5.0
Real Estate	1	5.0
Retired	3	15.0
Self Employed	2	10.0
Teacher	3	15.0
Travel Industry	1	5.0
Total	20	100.0

5.7 Marital Status

The 20 participants were asked to select one of the following choices: Single, Married, Separated and Divorced. The responses were, 9 Singles, 6 Married, 1 Separated and 4 Divorced. See Table 9 below.

Table 9: Marital Status

Variable	Frequency	Percent
Marital Status		
Single	9	45.0
Married	6	30.0
Separated	1	5.0
Divorced	4	20.0
Total	20	100.0

5.8 Household Income

The participants were asked to provide data on household income. Of the 20 participants, 3 declined to provide information, of the 17 that provided data, the breakdown is as follows: 1=10K, 1=11K, 1=19K, 3=25K, 2=30K, 1=35K, 2=60K, 1=78K,1=97K, 1=100K, 2=136K and 1=150K (see Table X below). The mean income of the 17 respondents was 60.4K, the Standard Deviation was 47.2K, and the median income was 35K. See Table 10 below.

Table 10: Income

Variable	Frequency	Percent
Income		
10K	1	5.88
11K	1	5.88
19K	1	5.88
25K	3	17.64
30K	2	11.76
35K	1	5.88
60K	2	11.76
78K	1	5.88
97K	1	5.88
100K	1	5.88
136K	2	11.76
150K	1	5.88
Totals	17	99.96

The income data were further broken down into three groups to perform more statistical analysis. The four income groups were 10K – 25K, 30K – 60K and 78K-150K. An ANOVA or analysis of variance of the pre and post change in scores on the Perceived Stress Scale was conducted and found to be not significant ($F(2,14)=0.90$, $p\text{-value}=.432$). As displayed in Table 13 below, those in the higher income group, earning between 78K and 150K annually, reported the least decrease in perceived stress compared to the other two groups, although the middle income group decreased slightly more than those earning the least per year. See Table 11 below.

Table 11: ANOVA for Income Groups

Variable	N	Mean	SD	F	p-value
Income					
10K-25K	3	-10.0	2.6	0.9	0.432
30K-60K	9	-12.4	9.6		
78K-150K	5	-5.8	9.6		
Total	17	-10.0	8.9		

5.9 Perceived Stress Scale Scores

The Perceived Stress Scale scores were calculated according to the formula mentioned on page 38. The Raw Data Pre-Formula Score indicates how the participants answered the 14 items on the scale during the data collection session. The Coded Data Pre-Formula Score indicates the scoring after the reversal on the seven positive items on the Perceived Stress Scale. The same method was used to obtain the Post Formula Scores. See Table 12 below.

Table 12: Perceived Stress Scale Scores

Participant	1	2	3	4	5	6	7	8	9	10
Pre Raw	33	25	35	40	36	36	34	30	30	35
Pre Coded	23	27	9	40	34	14	32	26	26	33

Participant	11	12	13	14	15	16	17	18	19	20
Pre Raw	36	34	35	28	32	30	30	33	29	38
Pre Coded	26	38	25	30	30	24	28	23	31	22

Participant	1	2	3	4	5	6	7	8	9	10
Post Raw	31	14	36	30	33	33	31	24	30	31
Post Coded	17	20	9	14	25	14	11	12	20	23

Participant	11	12	13	14	15	16	17	18	19	20
Post Raw	38	10	34	26	30	27	36	29	28	31
Post Coded	34	24	30	16	18	27	8	18	16	11

When all scores had been tabulated, the Pre-treatment Coded Scores were compared to the Post-treatment “Coded Scores” to arrive at the “Net Score Change.” See Table 13 below.

Table 13: Net Score Change

Participant	1	2	3	4	5	6	7	8	9	10
Pre- Coded	23	27	9	40	34	14	32	26	26	33
Post- Coded	17	20	9	14	25	14	11	12	20	23
Net Change	-6	-7	0	-26	-9	0	-21	-14	-6	-10

Participant	11	12	13	14	15	16	17	18	19	20
Pre-Coded	26	38	25	30	30	24	28	23	31	22
Post-Coded	34	24	30	16	18	27	8	18	16	11
Net Change	+8	-14	-5	-14	-12	+3	-20	-5	-15	-11

5.10 Summary Statistics for Perceived Stress Scale (n=20).

An analysis was done to determine distribution and/or skewness of scores. Skewness (SK) divided by the Standard Error of Skewness (SE) provides an assessment of the

normality of distribution. SK/SE values within +/- 2.0, indicate a normal bell-shaped distribution. For the Perceived Stress Scores, the assumption of normality underlying the comparative statistics (*t-test* and ANOVA) have been met. See Table 14 below.

Table 14: Summary Statistics for Perceived Stress Scale (n=20).

	Pre-Formula	Post-Formula	Change
Mean	27.1	18.4	-8.7
Median	26.5	17.5	-9.5
Mode	26	11	-14
Std. Deviation	7.3	7.1	8.9
Skewness(SK)	-0.6	0.6	0.1
Std. Error of SK	0.5	0.5	0.5
SK/SE	-1.2	1.1	0.2
Minimum	9	8	-26
Maximum	40	34	8

5.11 Significance of Score Decrease

A paired *t-test* was used to determine the significance of the change in perceived stress scores from pre to post formula. The decrease was highly significant ($t(19)+4.37$, $p < .001$). See Table 15 below.

Table 15: Significance of Score Decrease

	Mean	SD	t	Df	p-value
Pre-Formula	27.05	7.258	4.370	19	< .001
Post-Formula	18.35	7.081			

6. Discussion

This small sample non-randomized clinical trial was

conducted to determine if the modified and proprietary herbal formula based on the classic herbal formula *Bupleurum and Dragon Bone (Chai Hu Long Gu Mu Li Tang Jia Jian)* had an effect on perceived stress. The researcher’s hypothesis was that administration of the herbal formula for one month would decrease perceived stress. The null hypothesis for this trial stated that there would be no difference between the pre and post formula scores of perceived stress as measured by the 14 Item Perceived Stress Scale. The statistical results obtained from analyzing the pre and post scores determined that the null hypothesis would not be accepted. A paired *t-test* was used to determine the significance of the change in perceived stress from pre to post test. The decrease in scores was highly significant, (*t*

(19) = 4.37, $p < .001$).

6.1 Implications for Theory

Stress has no exact equivalent in the theoretical literature of Chinese medicine, nor do we find a definition of stress in Western literature that will satisfy all in the field of stress research. This clinical trial employed a Chinese herbal formula with a traditional function of harmonizing the *shaoyang*, unblocking the three yang stages, and calming the mind and spirit. The major condition at work here is one of constraint. Constraint can take many forms of physical manifestation including, tightness, anxiety, headache, insomnia, irritability, and hypochondriac pain and distention. In Chinese theory, the organ system that is most involved in this mechanism is the Liver. One of the most important functions of the Liver is the up-bearing and down-bearing of *qi* in the body. In western medical terms, it has been demonstrated in the research literature that the stress response elicits the release of certain neurotransmitters in the body that cause a cascade of systemic adjustments to divert the body's resources to systems in the body that deal with the fight or flight response. In so doing, the body diverts resources away from the digestive system, immune system and any other organ system not directly involved in survival. In accomplishing this task, there is an impact on the *qi* dynamics in the body that causes stagnation of the Liver *qi*. When the body diverts energy away from the digestive system, for instance, the *qi* mechanism will become stagnant; this may cause an obstacle or blockage in the free flow of energy that is necessary for proper Liver function. Liver *qi* stagnation will lead to more of the *qi* dynamic to become impeded. According to Chinese medical theory, as soon as Liver *qi* is depressed, the depressed *qi* dynamic causes disease.

The current trial demonstrated that the herbal formula *Bupleurum* and *Dragon Bone* (*Chai Hu Long Gu Mu Li Tang Jia Jian*) is effective in alleviating the constraint of the *qi* dynamic in the body and relieving the effects of stress. In terms of Western medicine, this formula is effective in regulating the function of the hypothalamic-pituitary-adrenal axis and its relation to the allostatic load placed on the body by stress.

6.2 Implications for Practitioners

The formula employed in this clinical trial is well known by most practitioners of classical Chinese medicine and TCM. Any practitioner who has been in practice for any length of time cannot help but notice the role that stress plays in the etiologies of disease states in their patients. The results of this clinical trial demonstrates a practical application for the use of the herbal formula *Bupleurum* and *Dragon Bone* (*Chai Hu Long Gu Mu Li Tang Jia Jian*) in the reduction of stress. In the area of healthy ageing and longevity, this clinical trial has implications for the use of this formula to help restore the normal 'qi mechanisms' of the body leading ultimately to a longer and healthier lifespan.

7. Conclusion

The current study found that the herbal formula *Bupleurum* and *Dragon Bone* (*Chai Hu Long Gu Mu Li Tang Jia Jian*) had a statistically significant effect in lowering scores on the Perceived Stress Scale. The fact that the results of the study surpassed minimum standards of significance is promising for further research into this formula. The implication of

these findings is that practitioners of both Eastern and Western medicine have a viable tool to prescribe to their patients who are seeking ways to manage stress.

In terms of the integration of Chinese and Western medicine, the current study suggests that this herbal formula may be able to replace many pharmaceuticals that carry with them the potential of physical and/or psychological dependence and addiction. In addition, it is the function of Chinese medicine to address root causes of disharmony and bring the body back to a state of health; this may vary from the function of Western pharmaceuticals that may be more palliative in nature while not addressing the underlying disharmony.

The current study has shown examples of the detrimental effects of stress on most of the organ systems of the body and epigenetically on the loss of telomere length. The slow accumulation of those effects places an allostatic load on the body that has direct implications for the healthy aging and longevity of human beings. The current study has given Western and Eastern practitioners a viable tool for their patients suffering from stress.

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