



## Intervention of Collective Exercise on the Mental Health of Elderly Hypertensive Patients

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### Abstract

**Background:** Anxiety, depression, and other adverse psychological reactions are often observed in elderly hypertensive patients. Appropriate exercise is a safe form of adjuvant therapy without causing side effects among these patients, with consistent effects on patients' mental health. In this study, a collective exercise intervention experiment was conducted to evaluate the mental health of elderly hypertensive patients and to verify the effect of the psychological intervention of collective exercise.

**Method:** A total of 115 elderly hypertensive patients aged 60–70 years old were selected as study subjects from May 2012 to January 2015 in Fuzhou City, Fujian Province, China. A total of 57 patients were included in the control group and 58 patients were assigned in the experimental group. Patients in the experimental group participated in a 12 weeks exercise intervention, while patients in the control group didn't participate in any regular physical exercise.

**Results:** After intervention, the Symptom Checklist-90 (SCL-90), total score, somatization, obsessive-compulsive symptom, interpersonal sensitivity, depression, anxiety, hostility, and paranoia scores of the experimental group were significantly lower than those of the control group ( $P < 0.05$ ). The positive coping style score of the experimental group was significantly higher than that of the control group ( $P < 0.05$ ); by contrast, the negative coping style score of the experimental group was significantly lower than that of the control group ( $P < 0.05$ ).

**Conclusion:** The mental health level and coping ability of elderly hypertensive patients can be effectively improved with the proposed treatment.

**Keywords:** Collective exercise, Hypertension, Mental health, Elderly people

### Introduction

The mental health of the elderly has been extensively investigated in the social aspect. Mental health problems have been observed in the elderly because of changes in age, living conditions, and physical conditions, such as loneliness, depression, anxiety, and fear (1, 2). In modern medicine, hypertension is considered as a somatopsychic illness. Unhealthy lifestyle and psychosocial factors induce hypertension (3). Anxiety, depression, and other adverse psychological reactions severely affect elderly hypertensive patients (4). If these adverse

somatopsychic conditions are not relieved for a long time, elderly hypertensive patients likely develop psychological illnesses; their psychological problems may be more serious and may thus develop into a social crisis. Therefore, geriatric care should focus on solving mental health problems of elderly hypertensive patients.

Hypertension is a worldwide health problem. The incidence of hypertension increases and the control effect remains unsatisfactory (5, 6). More than half of the elderly aged over 60 yr suffers from the

hypertension (7). In 2010, 98,548 residents aged over 18 years were surveyed using a multi-stage stratified cluster random sampling method in 162 monitoring points in China. A total of 37,461 cases of hypertensive patients were detected, and the prevalence rate of hypertension mostly in the elderly was 38.0% (8). Zhang et al. surveyed the prevalence of hypertension aged  $\geq 60$  in Xinjiang, China and found that the prevalence of hypertension among the elderly aged  $\geq 60$  years is 65.0%. This finding indicates that hypertension seriously affects the mental health and life quality of the elderly (9). The mental health of primary hypertensive patients has been extensively investigated. Anger, anxiety, depression, fear, and other negative emotions likely induce primary hypertension. Negative emotions can reduce the life quality of patients and affect the development and prognosis of hypertension to a certain extent (10-12). Depression and other negative emotions can also reduce the compliance of hypertensive patients who consume antihypertensive drugs and affect the treatment of hypertension (13).

In terms of the mental health intervention of hypertensive patients, forest therapy in forest environment based on "cognitive therapy" has been administered to hypertensive patients in South Korea (14). Richardson et al. (15) facilitated physical exercise intervention experiments on patients with serious mental health problems, including a population with cardiovascular diseases as the original disease, then they concluded that changes in lifestyle positively affect the treatment of chronic diseases, exercise is a valuable and worthwhile intervention for patients suffering from chronic diseases with mental disorders. Wang and Lin (16) randomly divided hypertensive patients into two groups: aerobic training group and conventional drug control group. After experimental intervention was administered for 3 years, the material life score, psychological function score, social function score, and life quality score in the life quality comprehensive assessment questionnaire-74 (GQOLI-4) of the training group were significantly higher than those of the control group (16). Therefore, appropriate exercise is a safe adjuvant therapy without inducing side effects to hypertensive pa-

tients; its effect on the mental health of patients has been consistently recognized. However, the cognitive domain of most patients in China that controls their blood pressure focuses on regular medicine intake and other basic treatment measures; their compliance in health maintenance and exercise is poor (17). Collective motion studies on psychological intervention in a specific population of elderly hypertensive patients are few.

This study aimed to provide a reference of the rehabilitation treatment of hypertension, to formulate social pension services, and to improve the mental health of the elderly in the future.

## **Methods**

A total of 115 elderly hypertensive patients (70 yr  $\geq$  age  $\geq 60$  years) from Fuzhou City of China (Gulou District, Jinan District, Taijiang District, Cangshan District, and Mawei District) were randomly selected as research objects from May 2012 to January 2015, with the assistance of a specialist/physician in a cardiovascular internal medicine department and a psychological consultation room in the First Affiliated Hospital of Fujian Medical University in Fuzhou City of China. The course of hypertension was from 1 yr to 15 yr, with an average of 6.2 yr. The inclusion criteria were as follows: 1) patients who conformed to the diagnostic criteria in hypertension prevention and cure guideline in China (18, 19); 2) patients who exhibited a stable state of illness and who were conscious; 3) patients who could be regularly reviewed; 4) secondary hypertensive patients and those regular exercises within 1 year were excluded; 5) patients without experimental contraindication; 6) participants who knew the objective and method of this intervention experiment and those who volunteered to participate in it. The questionnaire was used in strict compliance with the principle of informed consent. This study was approved by the ethics committee of Fujian Medical University. The researchers introduced the research purpose, methods, and confidentiality agreement to the subjects. The subjects volunteered to participate in this investigation.

A total of 115 patients were randomly divided into the experimental group and the control group, a total of 57 patients, including 25 females and 32 males, were included in the control group, with an average age of  $66.5 \pm 11.1$  years. A total of 58 patients, including 30 females and 28 males, with an average age of  $68.2 \pm 12.1$  years, were assigned in the experimental group.

The subjects were requested to study and master the collective exercise in advance through random allocation. The natural conditions, marriage status, and other general conditions were registered. The preliminary survey was performed to determine the mental health level by using a symptom checklist 90 (SCL-90) scale and a simple coping style questionnaire for 12 weeks. The subjects were also examined with the SCL-90 scale and the simple coping style questionnaire.

### **Research tools**

1) SCL-90 is a current extensive checklist scale for mental disorders and psychological illnesses in outpatient service (20). The scale included 1–5 levels of evaluation standards, with a total of 90 chapters on 10 factors: somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, terror, paranoia, mental illness, and other items. The scores were divided into five levels: “no, mild, moderate, severe, and serious”. The total score was the sum of 90 chapters. When the total score was greater than 160, the number of the positive items was more than 43 or a certain factor was more than 2, which was positive (21). In this study, the total score and the first 9 factor scores were considered as indicators to evaluate the mental health level. A low score corresponds to a high mental health level; conversely, a high score indicates a low mental health level.

2) A simplified coping style questionnaire (SCSQ) was compiled by Xie (22) and is mainly used to evaluate an individual’s coping style and coping capacity. The questionnaire exhibited reliable validity (22). The questionnaire adopted self-assessment and included 20 items, with two dimensionalities: positive and negative coping styles. The positive coping style (items 1–12) mainly embodied the positive coping conditions of the subjects. The negative

coping dimensionality (items 13–20) mainly covered the negative conditions of the subjects. The score was evaluated with a scale of 0–3. A high positive coping style score corresponds to a more positive coping style. A high negative coping style score indicates a more negative coping style.

### **Intervention method**

1) For the control group or irregular exercise group, the subjects did not participate in any regular physical exercise for 12 weeks and accepted the regular hypertension treatment according to the doctor’s advice.

2) For the experimental group or collective exercise group, the exercises included “Baduanjin” and “elderly ballroom dancing.” The patients in the exercise group accepted traditional Chinese gymnastics training in the form of centralized training in “Baduanjin.” In addition, the professional teacher taught the patients elderly ballroom dancing. According to the hypertension rehabilitation standards and physical exercise training principles of the elderly body, the researchers strictly arranged collective exercise, as follows: warm-up exercise, which can reach the target heart rate, and relaxation exercise. In this experiment, the target heart rate was 60%–80% of the maximum heart rate MHR predicted according to age (male =  $220 - 0.7 \times \text{age}$ ; female =  $220 - 0.8 \times \text{age}$ ) (23), which was set to the moderate intensity exercise. The dynamic changes in the exercise were monitored by wearing the heart rate monitor watch. The blood pressure was monitored before the training was performed and half an hour after the training was completed. The subjects participated in the exercise 4 times a week for 12 weeks, and each session lasted 50–60 min. The “Baduanjin” and “elderly ballroom dancing” sessions were alternately conducted. For example, “Baduanjin” training was set on Monday and “elderly ballroom dancing” was set on Wednesday. With this approach, the patients accepted the regular hypertension treatment according to the doctor’s advice.

### **Statistical methods**

Data were analyzed using SPSS 15.0 (Chicago, IL, USA). Quantitative data were expressed as mean  $\pm$

standard deviation. The mean comparison between the two groups was evaluated with *t* test. The intra-group comparison was performed with a paired *t*-test. Qualitative data were represented as the case number and constituent ratio. The comparison among groups was conducted with chi-square test or Wilcoxon rank test.  $P < 0.05$  indicated significant differences.

## Results

### General data comparison of the research object

Before intervention was performed, 57 and 58 patients were respectively included in the control group and the experimental group.

**Table 1:** Comparison between the general data of the study object

Variable		Control group (n=57)	Experimental group (n=58)	<i>P</i>
Gender	Male	32	30	0.635
	female	25	28	
Education level	Age	64.5±5.2	65.1±4.8	0.521
	Junior high school or below	40	38	0.866
	Senior high school or technical secondary school	12	14	
Junior college or above	5	5		
Marital status	Married	42	45	0.712
	Unmarried	4	5	
	Divorced	11	8	
Family economic situation	Poor	12	11	0.912
	Very poor	11	12	
	General	20	23	
	Better	8	7	
	Very good	6	5	

In Table 1, gender, age, education level, marital status, and family economic situation did not significantly differ between the two groups ( $P > 0.05$ ). Therefore, the general data were comparative.

### Comparison of mental health indicators before intervention

In Table 2, SCL-90 did not significantly differ from the coping style between the experimental group and the control group ( $P > 0.05$ ).

**Table 2:** Comparison of mental health indicators before intervention

		Control group	Experimental group	<i>t</i>	<i>P</i>
SCL-90	Total score	134.56±25.68	136.57±27.67	0.404	0.687
	Somatization	1.75±0.42	1.77±0.46	0.243	0.808
Obsessive-compulsive disorder		1.65±0.54	1.64±0.59	0.095	0.925
	Interpersonal sensitivity	1.59±0.55	1.62±0.61	0.277	0.782
Depression		1.41±0.42	1.43±0.46	0.852	0.396
	Anxiety	1.32±0.38	1.34±0.38	0.282	0.778
Hostility		1.61±0.47	1.59±0.49	0.223	0.824
	Terror	1.23±0.29	1.26±0.31	0.536	0.593
Paranoia		1.44±0.54	1.45±0.58	0.096	0.924
	Mental disease	1.31±0.37	1.33±0.34	0.096	0.924
Coping style	Positive coping style	2.12±0.61	2.06±0.55	0.554	0.581
	Negative coping style	1.35±0.36	1.31±0.37	0.587	0.558

### Comparison of mental health indicators after intervention

In Table 3, the total score, somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, and paranoia scores of SCL-90 of the experimental group were significantly lower than those of the control group ( $P < 0.05$ ). The terror and mental disease scores of the experimental group were also slightly lower than those of the control group, but the difference was not significant ( $P > 0.05$ ). The positive coping style score of the experimental group was significantly higher than that of the control group ( $P < 0.05$ ). By contrast, the negative coping style score was significantly lower than that of the con-

trol group ( $P < 0.05$ ). The total score, somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, paranoia, and negative coping style score obtained after intervention were significantly lower than those obtained before intervention; the positive coping style score was significantly higher significant ( $P < 0.05$ ). The SCL-90 terror and mental disease scores obtained after intervention were not significantly different from those obtained before intervention ( $P > 0.05$ ). The SCL-90 and coping style scores of the control group after intervention were not significant different from those obtained before intervention ( $P > 0.05$ ).

**Table 3:** Comparison of mental health indicators after intervention

		Control group	Experimental group	<i>t</i>	<i>P</i>
SCL-90	Total score	132.56±24.69	119.57±21.61	3.004	0.003
	Somatization	1.71±0.41	1.52±0.42	2.454	0.016
	Obsessive-compulsive disorder	1.67±0.52	1.34±0.51	3.436	0.001
	Interpersonal sensitivity	1.55±0.57	1.32±0.53	2.241	0.027
	Depression	1.45±0.48	1.23±0.41	2.644	0.009
	Anxiety	1.37±0.42	1.15±0.31	3.200	0.002
	Hostility	1.55±0.41	1.35±0.35	2.815	0.006
	Terror	1.26±0.33	1.21±0.35	0.788	0.432
	Paranoia	1.47±0.58	1.23±0.38	2.629	0.010
	Mental disease	1.33±0.31	1.23±0.31	1.730	0.086
Coping style	Positive coping style	2.17±0.57	2.39±0.51	2.182	0.031
	Negative coping style	1.37±0.35	1.01±0.27	6.182	0.000

## Discussion

Hypertension is a common geriatric disease and a common pathogenesis of stroke, heart failure, and other diseases. Moreover, hypertension is positively related to negative emotions, such as anxiety and depression (24). Trevisol et al. (25) conducted a cross-sectional study on 1,858 study objects and observed that the physiological and psychological health levels of hypertensive patients are poor, especially those who required drugs to stabilize their blood pressure (25). Among hypertensive patients, those with mild hypertension do not necessarily take antihyper-

tensive drugs. Simple exercise can achieve a certain effect (26, 27). Among patients who take antihypertensive drugs, exercise therapy can be used as a safe and effective treatment method. Therefore, a healthy lifestyle, including appropriate exercise and positive interpersonal activities, in addition to the correct diagnosis and effective treatment measures, is essential for hypertensive patients (28, 29).

Collective exercise therapy is defined as a physical activity completed through multiple cooperation. This psychological treatment method is applied collectively or in groups in rehabilitation medicine (30). The collective exercises selected in this

study were “Baduanjin” and “elderly ballroom dancing,” which are suitable for the elderly. “Baduanjin” is a treatment method with features of traditional Chinese rehabilitation medicine; this activity employs a combination of physical exercise and breathing (31). The amount of exercise in “Baduanjin” was appropriate and thus could strengthen the body, although the elderly unlikely becomes exhausted. This exercise can regulate the nervous system, strengthen the systematic blood circulation, and repair the function of various systems, with beneficial effects against various chronic diseases, especially those affecting the elderly population (31).

Elderly hypertensive patients easily suffered from a series of mind–body problems, such as anxiety and depression, because of physical health problems. These mind–body problems were closely related to social-contact group and interpersonal relations. In this study, the total score, somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, and paranoia scores of SCL-90 of the experimental group were lower than those of the control group. In addition, the total score, somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, paranoia, and negative coping style score after intervention were lower than those obtained before intervention; these findings are consistent with those obtained by Ling and Wang (32), Lin and He (33). This study on collective exercise intervention schemes did not emphasize psychological counseling; instead, this study employed a form of collective treatment to help elderly patients by improving their athletic ability, reducing physical discomfort, and changing the patients’ solitary state caused by disease, age, and other factors. The elderly patients trained together and exchanged personal information; as a consequence, an equal, warm, mutually encouraging, and supportive positive emotional atmosphere was created. The professional technical personnel participated in the process of intervention and served as confidants of the subjects and counsel of the elderly patients. In this manner, the personnel helped doctors and other professionals assess the patient’s health

problems. The personnel also assisted the elderly hypertensive patients enhance their interpersonal relationships and reduce or eliminate their fear of the disease to improve their mental health.

This study confirmed that the collective exercise intervention could improve the patient’s positive coping level and reduce the negative coping level of patients with disease response ability. Yan (34) adopted the aerobics exercise intervention in 106 college girls through natural experimentation, psychological measurement, mathematical statistics, and other research methods. Yan (34) found that physical exercise is a positive coping style. Steptoe and Edwards (1989) also believed that the long-playing physical exercise can reduce the negative copying style more effectively than relaxation or other interference measures do (35). These findings are consistent with those obtained in our study. The intervention effect could be attributed to the collective exercise as an activity characterized by neural excitation and thus could enhance the self-efficacy, self-esteem, and other psychological resources of the participants. For example, dance steps during the “elderly ballroom dancing” collective exercise changed as music varied at any time; this variation required the elderly patients to respond. As a consequence, the response rate of the elderly patients improved to a certain extent, their coping ability indirectly enhanced, and their ability to solve problems independently increased. Moreover, collective exercises could help the elderly patients divert their attention from their diseases; indeed, these forms of exercise could provide a good antagonistic support for the psychological response system. Therefore, collective exercises elicit positive and effective responses among elderly hypertensive patients.

## **Conclusion**

Collective exercises could effectively improve the mental health of elderly patients. Moreover, changes in coping ability indicated the positive role of the collective exercise on their mental health. “Baduanjin” and “elderly ballroom dancing” were selected because of the limited condi-

tions in this study. The sample and research methods will be further expanded. During the collective exercise intervention, the emotion, coping style, blood pressure, heart rate, and other physiological changes of the participants should be dynamically monitored.

## Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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## References

1. Banach M, Aronow WS (2011). Should we have any doubts about hypertension therapy in elderly patients. *Pol Arch Med Wewn*, 121(7-8): 253-258.
2. Gao C, Wang SJ, Yu PL (2014). Population aging status and development tendency. *Chin J Geriatr*, 33(8): 924-926.
3. Huang HL, Zhou Y, Wang HW (2013). Effects of cognitive behavioral therapy on psychological and physiological status of hypertension patients in Community. *Chin J Behav Med Brain Sci*, 22(4): 335-337.
4. Trevisol DJ, Moreira LB, Kerkhoff A, et al. (2011). Health-related quality of life and hypertension: a systematic review and meta-analysis of observational studies. *J Hypertens*, 29(2): 179-188.
5. Bhatt DL, Kandzari DE, O'Neill WW, et al. (2014). A controlled trial of renal denervation for resistant hypertension. *New Engl J Med*, 370(15): 1393-1401.
6. Muller M, Smulders YM, de Leeuw PW, et al. (2014). Treatment of Hypertension in the Oldest Old A Critical Role for Frailty? *Hypertension*, 63(3): 433-441.
7. Arslantas D, Ayranci U, Unsal A, et al. (2008). Prevalence of hypertension among individuals aged 50 years and over and its impact on health related quality of life in a semi-rural area of western Turkey. *Chin Med J (Engl)*, 121(16): 1524-1531.
8. Li YC, Wang LM, Jiang Y, et al. (2012). Prevalence of hypertension among Chinese adults in 2010. *Zhonghua Yu Fang Yi Xue Za Zhi*, 46(5): 409-413.
9. Zhang XL, Ma YT, Yang YN, et al. (2014). Prevalence, awareness, treatment and control status of hypertension in elderly population in Xinjiang. *Chin J Hypertens*, 22(001): 31-35.
10. Hu T, Jiang Y, Tang HJ, et al. (2013). Anxiety and depression among people with primary hypertension: A case-control study of prevalence and associated factors. *Med J West China*, 25(3): 363-365.
11. Liu MY, Duan XC (2013). Correlation Analysis on the Patients with Essential Hypertension in the Degree of Depression and Serum Homocysteine Level. *Chin Gen Pract*, 16(23): 2682-2684.
12. Ginty AT, Carroll D, Roseboom TJ, et al. (2013). Depression and anxiety are associated with a diagnosis of hypertension 5 years later in a cohort of late middle-aged men and women. *J Hum Hypertens*, 27(3): 187-190.
13. Sjösten N, Nabi H, Westerlund H, et al. (2013). Effect of depression onset on adherence to medication among hypertensive patients: a longitudinal modelling study. *J Hypertens*, 31(7): 1477-1484.
14. Sung J, Woo JM, Kim W, et al. (2012). The effect of cognitive behavior therapy-based "forest therapy" program on blood pressure, salivary cortisol level, and quality of life in elderly hypertensive patients. *Clin Exp Hypertens*, 34(1): 1-7.
15. Richardson CR, Faulkner G, McDevitt J, et al.

- (2005). Integrating physical activity into mental health services for persons with serious mental illness. *Psychiatr Serv*, 56(3): 324-331.
16. Wang L, Lin XY (2008). Observation of curative effect of low-intensity aerobic exercise adjuvant therapy on hypertension patients. *Chin J Phys Med Rehabil*, 30(3): 198-200.
  17. Yu XJ, Zhao Y, Zhu YY (2014). The study on cognition, compliance behavior and demand of integrated health management of hypertensive patients in community. *Chin J Gen Pract*, 12(12): 1983-1985.
  18. Wang W, Chen WW (2015). Hypertension lower management guidelines suitable for the situation of China. *Chin J Hypertens*, 2015, 23(1): 4.
  19. Liu LS (2011). 2010 Chinese guidelines for the management of hypertension. *Zhonghua Xin Xue Guan Bing Za Zhi*, 39(7):579-615.
  20. Schmitz N, Hartkamp N, Kiuse J, et al. (2000). The symptom check-list-90-R (SCL-90-R): a German validation study. *Qual Life Res*, 9(2): 185-193.
  21. Shan MH (1998). Measuring the level of mental health by correctly using SCL-90 and 16PF measurement. *Chin Mental Health J*, 12(2): 81-82.
  22. Xie YN (1998). A pilot study on reliability and validity of simplified coping style questionnaire. *Chin J Clin psychol*, 6(2): 114-115.
  23. Miao HS (2000). Rehabilitation Medicine Theory and Practice. *Shanghai Sci Tech Publishing House*, Shanghai, 355.
  24. Ginty AT, Carroll D, Roseboom TJ, et al. (2013). Depression and anxiety are associated with a diagnosis of hypertension 5 years later in a cohort of late middle-aged men and women. *J Hum Hypertens*, 27(3): 187-190.
  25. Trevisol DJ, Moreira LB, Fuchs FD, et al. (2012). Health-related quality of life is worse in individuals with hypertension under drug treatment: results of population-based study. *J Hum Hypertens*, 26(6): 374-380.
  26. Araujo R, Edilson Serpeloni C, Vaz R, et al. (2012). Cardiovascular fitness and cardiovascular risk factors among obese men and women aged 58 years and older, in Portugal. *Rev. méd. Chile*, 140(9): 1164-1169.
  27. Semlitsch T, Jeitler K, Hemkens LG, et al. (2013). Increasing physical activity for the treatment of hypertension: a systematic review and meta-analysis. *Sports Med*, 43(10): 1009-1023.
  28. Sun JZ, Zhang YH (2013). ASSA13-14-17 effects of Tai Chi exercises on vascular function in middle-aged and elderly women with hypertension symptom. *Heart*, 99(Suppl 1): A64-A64.
  29. Borjesson M, Urhausen A, Koudi, E, et al. (2011). Cardiovascular evaluation of middle-aged/senior individuals engaged in leisure-time sport activities: position stand from the sections of exercise physiology and sports cardiology of the European Association of Cardiovascular Prevention and Rehabilitation. *Eur J Cardiovasc Prev Rehabil*, 18(3): 446-458.
  30. Chen HH, Zhu YP, Luo SL (2013). Influence of collective motion excitation on COPD patients at stable stage. *Mod Clin Nurs*, 12(5): 23-25.
  31. Dai JG, Zhang C, Liao Y (2011). Cohort study on the improvement effect of practicing eight period of Jin on basic habitus and stamina of fatigue sub-health people. *Chin J Basic Med in Tradit Chin Med*, 17(2): 186-188.
  32. Ling K, Wang J (2011). Clinical observation of eight period of Jin adjuvant treatment on 50 cases essential hypertension. *China J Trad Chin Med Pharm*, 26(12): 3025-3026.
  33. Lin F, He QX (2014). Observation of curative effect of practicing eight period of Jin on treatment of old people Grade-1 hypertensives. *Chin J Geriatr Care*, 12(3): 25-26.
  34. Yan J, Sun XM, Chen AG (2011). Mediating Effects of Coping Style and Subjective Well-being: Experimental Study on Influences of Exercise on the Mental Health of Female College Students. *J Sport Sci*, 3(5): 95-99.
  35. Steptoe A, Edwards S, Moses J, et al. (1989). The effects of exercise training on mood and perceived coping ability in anxious adults from the general population. *J Psychosom Res*, 33(5): 537-547.