Effect of Korea Red Ginseng on the Symptoms and Hemodynamics in Healthy Elders

Jin En-Yuan, Li Ya-Jun, Yang Lian-Xing, Jin Ming, Wei Yu-Lin, Nam Ki Yeul*

China-Japan Friendship Hospital
**Korea Ginseng & Tobacco Research Institute*

Abstract

Clinical study on hemodynamics of healthy elders before and after tread mill. Using double-blind, placebo-controlled study design. Seventy-five 50-70 years old volunteers without organic disease were divided into two groups, Ginseng group and control group. Each subject was received 3 g Korea Red Ginseng (KRG) capsules or placebo per day for 4 weeks. Before and after administration 4 weeks, the symptoms were asked and hemodynamics parameter such as pump function, systolic function, preload and afterload were recorded before and after tread mill 1, 5, 10 minutes by the method of thoracic impedance cardiograph. The result showed that Ginseng could improve quality of life, had obvious effect of increasing PEP (pre-ejection period), PEP/LVET (pre-ejection period/left ventricular ejection period), PCWP (wedged pressure pulmonary capillary). The change rate of HR (heart rate), SV (stroke volume) in KRG group were much lowered, while EF (ejection fraction), LVET (left ventricular ejection period), LVEDP (left ventricular end diastolic pressure) was recovered much quickly. The circulation showed Ginseng could improve the quality of life though its promoting circulation function which are increasing both the systolic function and the preload.

Introduction

KRG has been studied extensively and deeply. It has serious actions in many aspects, such as reducing the level of total serum cholesterol and triglycerides, increasing the level of high density lipoprotein cholesterol in the patients of hyperlipidemia, and regulating the blood pressure in the patients. But these study focused on the patients not on the healthy subjects. The effects of KRG treatment on healthy have, so far, been poorly investigated. The present research was therefore designed to study the efficacy and safety on healthy subjects, especially to compare with

cardiac function after exercise loading with and without taking KRG.

Materials and Methods

Study design

Using double blind, placebo-controlled study design, we observed 75 subjects: (KRG group, Men:Women=14:36, age:58.7±5.1, and placebo group, Men:Women=1:24, age:57.5±5.0). All subjects were free from liver, renal, heart and other major organ diseases and the blood pressure (BP) <140/90 mmHg, Each subject was received 3 g of KRG capsule or placebo capsule per day for 4 weeks. The subjects received a full examination by physician every day. Blood samples were collected for biochemical studies before and after treatment respectively.

Treadmill exercise test and examination of cardiac function

Throughout the treadmill test, the data were recorded by CACH-2000 hemodynamic monitoring system. All individuals performed the exercise test. None of them was induced chest pain and inadequate blood pressure response. The hemodynamic data including pump function, pre and after loading product during treadmill exercise were comparative among all subjects treatment and controls. Cardiac function studied at pre-exercise, 1 min, 5 min, and 10 min post exercise, respectively.

Statistical analysis

All data were expressed as mean±SD. The statistical analysis was performed by using Students *t* test. Differences were considered to be significant when $P<0.05$.

Results

General characteristies at randomization

The baseline characteristies of KRG and placebo groups are summarized in Table 1. At randomization of two groups (KRG group and placebo group) were similar in their demographic clinical and biochemical characteristics. Both groups of individuals had similar age, sex and body mass index distributions.

Table 1. Baseline Characteristics of Individuals

	Ginseng group (n=50)	Placebo group (n=25)
Age (years)	58.7±5.1	57.4±5.0
Sex : Male	14	1
Female	36	24
Body Height (cm)	162.8±6.8	158.4±4.7
Body Weight (Kg)	61.9±11.8	65.8±8.3
SBP (mmHg)	118.9±12.3	137±16.8
DBP (mmHg)	75.2±7.4	84.3±8.2

Table 2. Changes in Bp before and after 2W. & 4W. KRG administration

	Ginseng group(n=50)	Placebo group(n=25)
Before		
SBP	118.92±12.21	136.6±16.75
DBP	75.2±7.3	83.84±8.22
2 week after		
SBP	123.08±12.83	137.04±15.07
DBP	73.72±8.08	77.32±9.31
4 week after		
SBP	121±9.72	128.16±17.99
DBP	75.26±6.96	78.8±9.93

Changes in Bp before and after 2 weeks and weeks KRG administration

Table 2 showed that Bp patterns during the study. When the data were analyzed according to treatment actually received. KRG did not affect Bp during resting condition. There were no significant differences in Bp between KRG and placebo groups.

The results of laboratory parameters before and after 4 weeks of KRG administration

A complete blood count and routing biochemistry examinations were done at baseline and at final visit. Table 3 showed that there were no significant differences in laboratory test, either at baseline or during double blind treatment between KRG and placebo. No significant difference between treatment groups in the frequency of laboratory abnomalities was noted.

Table 3. Changes of laboratory parameters before and after 4W. KRG administration in old group

	Ginseng group (n=50)		Placebo group (n=25)	
	Before	After	Before	After
TC(mmol/dL)	207.28±31.50	210.24±36.18	205.08±30.11	229.62±71.72
TG(mmol/dL)	120.83±64.66	129.71±70.50	214.54±171.76	188.46±119.20
Glu.(mg/dL)	109.32±64.42	108.1±64.06	85.54±17.47	92.15±25.41
GPT(IU/L)	16.39±7.31	18.47±5.47	19.85±15.31	19.00±11.19
WBC(10^9/L)	6.2±1.55	7.02±2.06	6.13±1.46	6.57±1.73
Hb(g/dL)	13.72±0.91	13.37±1.63	13.26±0.61	12.38±1.47

Table 4. Improvement of symptoms in old group before and after 4W. KRG administration

	Ginseng group (n=50)			Placebo group (n=25)		
	Total Cases	Improved Cases	Improved Rate(%)	Total Cases	Improved Cases	Improved Rate(%)
Short of breath	14	12	85.7	8	3	37.5
Amnesia	30	13	43.3	10	0	0
Chest distress	14	10	71.4	8	3	37.5
Tinnitus	20	12	60	11	3	27.2
Insomnia	12	5	41.7	10	1	10
Dry-mouth	15	3	20	9	0	0
Palpitation	13	9	69.2	7	4	57.1
Dizziness	17	11	64.7	10	2	52.9
Dreaminess	27	13	48.1	16	6	37.5
Headache	18	10	55.6	10	5	50

Improvement of symptoms in old group before and after 4 weeks of KRG administration

KRG treatment was successful in improving symptoms., especially improved 48.2% of short breath, 43.2% of amnesia, 33.9% of chest distress, 32.8% of tinnitus and 31.7% of insomnia, but the improved rate was significantly lower in the placebo subjects.

Possibly drug related side effects after 4 weeks of KRG administration

Possibly drug related side effects are shown in Table 5. KRG tolerated well in this study. All subjects continued treatment during the 4 weeks of the study. 1 case (6.25%) soreness of loin, 1 case (5.26%) short breath, 2 cases (7.69%) headache, 1 case (7.69% palpitation) 1 case (7.14%)

Table 5. Possibly drug related side effects

Symptoms	Total Cases	Possibly drug related side effects	Rate (%)
Fatigue	31	0	0
Soreness of Loins	16	1	6.25
Short of Breath	19	1	5.26
Aversion to Cold	6	0	0
Headache	26	2	7.69
Red Face	13	0	0
Palpitation	13	1	7.69
Sweating	14	1	7.14

sweating. There were no significant adverse events between treatment and placebo groups. These had no apparent clinical importance, as they were slight.

Effect of KRG treatment on cardiac function during treadmill exercise

All healthy old group (n=50) before and after treatment and 25 healthy controls performed a treadmill test. KRG could change some parameters compared with pre-exercise and placebo on

Table 6. The results of hemodynamics parameters before and after 4W. KRG administration

	Ginseng group (n=50)		Control group (n=25)	
	Before	After	Before	After
HR	67.84±9.22	64.81±7.80	67.52±8.73	68.68±7.51
SV(ml/B)	82.52±23.52	89.54±32.47	66.88±22.31	67.96±21.22
CO(L/min)	5.50±1.52	5.76±1.70	4.46±1.43	4.64±1.40
CI(L/min•m^2)	3.34±0.88	3.48±0.99	2.7±0.90	2.82±0.91
EF	0.60±0.06	0.60±0.04#	0.60±0.04	0.61±0.05
TPR(D.S/cm^{-5})	1392.1±479.3	1343.0±405.3	2049.1±844.3	1861.6±723.0
AC(ml/B/mmHg)	1.95±0.64	2.02±0.70	1.37±0.62	1.40±0.53
PEP(s)	0.09±0.03	0.10±0.02##	0.10±0.02	0.09±0.02
LVET(s)	0.38±0.05	0.37±0.05	0.37±0.04	0.38±0.04
PEP/LVET	0.25±0.09	0.27±0.07#	0.26±0.09	0.25±0.08
PCWP(mmHg)	8.82±3.37	9.41±3.56#	8.32±3.28	8.39±2.83
LVEDP(mmHg)	9.54±3.88	10.07±4.07	8.98±3.77	9.11±3.18

Compared to before administration, #P<0.05, ##P<0.01

Table 7. The results of hemodynamics parameters after a treadmill ($X\pm S$)

		1 min after	5 min after	10 min after
HR	before	106.78±18.44	80.33±12.23	78.65±11.07
	after	92.73±18.34#	76.57±11.28#	75.22±10.31#
SV	before	65.57±29.09	89.02±32.36	78.6±24.30
(ml/B)	after	79.81±30.88#	88.38±34.69	78.5±23.45

Compared to before administration, #P<0.05, ##P<0.01

Table 8. The change rate of hemodynamics after a treadmill ($X\pm S$)*

		1 min after	5 min after	10 min after
CO	before	20.4±39.0	26.8±22.2	9.8±15.8
(%)	after	22.6±33.8	17.1±31.8	0.4±25.1
CI	before	25.2±51.6	30.5±44.5	12.1±22.7
(%)	after	24.9±35.1	17.3±31.6	0.2±24.4
EF	before	-7.6±12.5	-0.4±9.1	1.0±8.5
(%)	after	-3.9±8.4#	-0.9±6.0	0.9±6.0
PEP	before	-8.2±23.1	14.5±132.0	-4.7±20.5
(%)	after	-16.6±18.9##	14.2±133.0	-7.1±16.7
LVET	before	-37.7±13.1	-10.7±11.2	-5.2±10.1
(%)	after	-27.7±15.0#	-9.2±12.6	-3.0±12.4
PEP/LVET	before	70.5±121.1	27.3±125.6	27.1±184.6
(%)	after	20.8±38.9##	6.4±23.4	-2.6±22.4
PCWP	before	46.1±60.7	11.6±31.6	-0.4±24.7
(%)	after	22.0±47.1	8.2±36.1	-2.2±34.4
LVEDP	before	49.7±68.53	12.8±33.8	-0.1±26.6
(%)	after	27.1±51.7##	11.1±39.0	-1.1±36.9
TPR	before	-6.3±45.3	-20.3±16.5	-7.9±16.8
(%)	after	-12.6±28.7	-8.5±22.3#	-0.4±27.7#

Compared to before administration, #P<0.05, ##P<0.01
Hemodynamics change rate after a treadmill = (after a treadmill at quiet) / at quiet *100%

exercise loading. Results are presented in Table 6, 7, 8.

KRG had obvious effect of increasing PEP, PEP/LVET, PCWP, compared with control. After treadmill the change rate of HR, SV were much lowered than control. EF, LVET, LVEDP was recovered much quickly.

The KRG can improve the quality of life through its promoting circulation function, which increasing both the systolic and the preload.

Discussion

Many studies investigating the potential benefits of KRG have used an open and unblind design, lacked a control group and had a comparative poorly short follow up period. A majority of previously performed studies have involved elderly subjects or clinically ill patients.

In the present double-blind study, we investigate the efficacy and safety of KRG administration in healthy old subjects. Efficacy evaluation with measures that reflect the subjective response to treatment in terms of symptomatic relief and improvement in day-to-day functioning, that is, quality of life(QOL), The results showed that both the KRG and placebo improved aspects of QOL, but the increase from base line was more pronounced in subjects who taking the KRG. It was concluded that in healthy subjects, KRG offers significant advantage over placebo treatment. The beneficial effects appear to be more pronounced in those subjects who were at a disadvantage condition or worse off the study started.

Safety analyses were performed on the total randomized population. Baseline clinical safety assessments including a complete clinical history, a physical examination, a laboratory test with each subject. KRG was well tolerated in this study. All subjects continued treatment. The 15 common adverse events are shown in frequency of laboratory test abnormalities. KRG have some slight side effect. These had no apparent clinical important, as they were slight and did not affected the clinical treatment. These may be due to KRG having slightly warm in nature.

KRG exhibited a higher degree of safety and a well toleration during KRG treatment. This makes KRG suitable for preventive purpose and for long term therapy.

In this study, we investigated the effect of KRG on circulatory function during exercise test. The result of treadmill test showed that KRG reduced the increase in SV, TPR (total peripheral resistance) of KRG group was much lower during exercise, and a greater, faster decrease in these value during the recovery stage. This is an indirect indication a clearly demonstrated oxygen consumption, increased work capacity and quick recovery from exercise loading.

In healthy subjects the KRG offers significant advantages over placebo treatment in terms of improvement SV, PCWP and AC (aortic compliance). KRGs observed effects on physical activity can be attributed to the results of above synergism.

KRG would seem to have played an important role in the treatment and prevention. Further investigation, however, are needed to examine the efficacy of KRG preventive measures.

Conclusion

In the study, KRG was well tolerated and effective in improving quality of life and increasing cardiac function. This suggests that KRG is suitable for preventive purpose and for long term therapy.

Acknowledgements

This study was supported by grants-in-aid and red ginseng powder for scientific research from Korea Ginseng & Tobacco Research Institute.

References

1. Caso Marasso A., et al. Double-blind study of multivitamin complex supplemented with ginseng extract. Drugs Exptl. Clin. Res. 1996, XII(6), 323-329.
2. Ingela wiklund., et al. A double-blind comparison of effect on quality of life of a combination of vital substances including standardized ginseng G115 and placebo. Current Therapeutic Research. 1994, Vol. 55, No. 1.
3. Giuliana Pieralisi., et al. Effects of a standardized ginseng extract combined with dimethylaminethanol bitartrate, vitamins, minerals, and trace elements on physical performance during exercise. Clinical Therapeutics. 1994, Vol.13, No.3, 373-382.
4. 金子仁等, 高麗參粉の臨床效果の檢討. 臨床の研究. 1981, 58卷 13號, 145-149.