

# Comparison of the Effects of Xuezhikang and Simvastatin on Lipid Profile Modification in Patients with Hypercholesterolemia

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**[Abstract] Objective** To study the effects of Xuezhikang on lipid profile modification in patients with hypercholesterolemia and to compare it with Simvastatin. **Methods** 28 patients with hypercholesterolemia were randomly divided into a treatment group (n = 15, Xuezhikang 1.2g/d qn, P.O) and a control group (n = 13, Simvastatin 10 mg/d qn, P.O). Blood samples were taken from forearm vein (fasting for 12h) before and 4 weeks, 8 weeks after the treatment. Serum lipid profile was determined enzymatically and turbidimetrically. **Results** (1) The effects of Xuezhikang in lowering serum total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C) levels were the same as Simvastatin; the concentrations of TC and LDL-C decreased by 20.7% and 28.2% in Xuezhikang group ( $P < 0.001$ ,  $< 0.01$ ) and by 22.5% and 33.0% in the control group ( $P < 0.001$ ,  $< 0.01$ ) respectively. (2) Xuezhikang decreased serum triglyceride (TG) levels by 17.4% ( $P < 0.05$ ) after 4-week treatment, but the effect of Simvastatin lowering TG was not statistically significant. (3) Although concentrations of high density lipoprotein cholesterol (HDL-C) was not changed after 4-week treatment, apolipoprotein AI (ApoAI) levels elevated by 12.7% and 13.6% in the two groups respectively; apolipoprotein B (ApoB) levels lowered by about 8% ( $P < 0.05$ ) in both groups. It is interesting to note that lipoprotein(a) levels decreased by 31.3% and 27.8% ( $P < 0.05$ ) in both the Xuezhikang and Simvastatin groups after 8-week treatment. (4) Differences of the effects of both medicines on lipid serum profile at the end of 4-week and 8-week were not significant, though further lowering of the concentration of Lp(a) was noted in Xuezhikang group after 8 weeks as compared with 4 weeks. **Conclusion** Xuezhikang could markedly decrease TC and LDL-C concentrations of patients with hypercholesterolemia and the effects of Xuezhikang were the same as those of Simvastatin. TG lowering effects of Xuezhikang were superior to that of Simvastatin. [Key words] Hypercholesterolemia Simvastatin Xuezhikang

The treatment of hypercholesterolemia plays an important role in primary and secondary prevention and cure of coronary heart disease<sup>1</sup> Clinical studies indicate that, as a major lipid lowering medicine mainly containing HMG-CoA reductase inhibitor, Xuezhikang can effectively reduce serum TC, TG, LDL-C levels and increase HDL-C level of hyperlipidemia patients.<sup>14-6l</sup> In this study, Simvastatin was selected in the control group in order to compare lipid regulation effects of the two medicines.

## Patients and Methods

### 1. Selection of Patients

28 hypercholesterolemia patients who were not treated by other medicines were chosen (TC > 6.0 mmol/L or associated with TG > 2.26 mmol/L and patients with liver, renal or thyroid diseases were excluded) as subjects. They ceased administrating of other lipid lowering medicines for 4 weeks with the serum testing indexes still higher than the above standards. These patients were divided into two groups randomly. One was 15-case Xuezhikang group with 10 men and 5 women, aging  $60 \pm 10$  years old and the body weight index (BWI)  $24.7 \pm 2.1$ . Among them, 9 cases were accompanied with hypertension and 3 with coronary heart disease. Another was the 13-case Simvastatin group with 8 men and 5 women, aging  $54 \pm 10$  years old and BWI  $24.8 \pm 2.9$ . Among them, 7 cases occurred with hypertension and 2 with coronary heart disease. The serum lipid levels of the two groups were basically the same. See Table 1.

## 2. Methods

### 2.1 Drug Administration and Examinations

Patients in Xuezhikang group took 1.2 g draught Xuezhikang in the evening (Xuezhikang capsule is provided by WBL Peking University Biotech Limited Company, product approval number of 951002). Whereas subjects in Simvastatin group took 10 mg draught Simvastatin after dinner (The commercial name of Simvastatin is called ZOCOR, product of Merck Sharp & Dohme China Limited Company). Forearm venous blood samples were taken on 12h-fasting patients after 4-week and 8-week treatment. Serum samples were stored under  $-50^{\circ}\text{C}$ ., All samples were tested once within 4 months. Before and after 8-week treatment, BUN, creatinine, ALT, creatinekinase and GLU were tested. During the treatment, patients basically kept their dietary habit and lifestyle unchanged. And subjects with hypertension or coronary disease could continue their administration of medicines as long as they did not impose any influence on lipid metabolism.

### 2.2 Testing Indexes

Enzyme agent method was employed to determine the concentrations of TC, TG and HDL-C (after magnesium phosphotungstun precipitation). The concentration of LDL-C was deprived from the formula:  $\text{LDL-C} = \text{TC} - \text{HDL-C} - \text{TG} \times 0.46$ . Histoimmunological method was used to test ApoA1 and ApoB levels and ELISA method for Lp(a) concentration.

2.3 Statistical analysis: t-test was adopted in statistical analysis.

### Results

1. There were no particular side-effects after 4-week and 8-week treatment of Xuezhikang or Simvastatin. There were also no significant changes of BUN, myaanhydride, ALT, creatinekinase and GLU levels.

2. After 4-week and 8-week treatment, Xuezhikang reduced serum TC by 20.7% and 22.3% respectively and Simvastatin reduced serum TC by 22.5% and 22% respectively with  $P < 0.001$  indicating same serum TC reduction functions of both medicines. Xuezhikang also performed similar to Simvastatin in terms of LDL-C reduction. LDL-C level decreased by 28.2% and 30% respectively in Xuezhikang group ( $P < 0.01$ ), and 33% and 32.6% respectively in Simvastatin group ( $P < 0.001$ ). In addition, Xuezhikang significantly decreased TG by 17.4% after 4 weeks treatment and 18.8% after 8 weeks treatment ( $P < 0.05$ ) whereas . Simvastatin produced no statistical differences in TG reduction. Therefore, the reduction level of TC and LDL-C by Xuezhikang and Simvastatin was more significant than TG reduction (Table 1).

3. It was also showed in the study: 4 weeks and 8 weeks after the treatment by Xuezhikang or Simvastatin, through no obvious change occurred in HDL-C level, ApoA1 concentration did increase by 12.7% and 11.9% in Xuezhikang group and 13.6% and 18.2% respectively in Simvastatin group with both  $P < 0.01$ . ApoB level obviously decreased by about 8% in both groups. In addition, Xuezhikang reduced Lp(a) by 31.3% ( $P < 0.01$ ) and Simvastatin lowered Lp(a) level by 27.8% ( $P < 0.05$ , Table 2).

4. Table 1 Comparison of Lipid Levels between the Two Groups (mmo1/L,  $\bar{X} \pm s$ )

Groups	Hyper- lipidemia cases		TC	TG		HDL-C	LDL-C	ApoA1	ApoBLp(a)
	Ila	Ilb							
Xuezhikang	6	9	6.64 $\pm$ 0.8	2.82 $\pm$ 0.58	1.44 $\pm$ 0.19	3.90 $\pm$ 0.95	1.34 $\pm$ 0.14	1.15 $\pm$ 0.10	0.16 $\pm$ 0.07
Simvastatin	6	9	6.71 $\pm$ 0.59	2.23 $\pm$ 0.66	1.4 $\pm$ 0.15	4.27 $\pm$ 0.73	1.32 $\pm$ 0.12	1.19 $\pm$ 0.06	0.18 $\pm$ 0.07

Table 2 Comparison of Xuezhikang and Simvastatin on Lipid Modification for Hypercholesterolemia Patients (mmol/L, X±s)

Lipid Profile	Before Treatment		4-Week		8-Week	
			After Treatment		After Treatment	
	Xuezhikang	Simvastatin	Xuezhikang	Simvastatin	Xuezhikang	Simvastatin
Serum TC	6.64 ± 0.88	6.71 ± 0.59	5.26 ± 0.78*	5.20 ± 0.77*	5.16 ± 0.75*	5.23 ± 0.65*
Serum TG	2.82 ± 0.58	2.23 ± 0.66	2.33 ± 0.616	1.97 ± 0.84	2.29 ± 0.72°	1.99 ± 0.94
HDL-C	1.44 ± 0.19	1.41 ± 0.15	1.49 ± 0.24	1.43 ± 0.15	1.47 ± 0.22	1.44 ± 0.23
LDL-C	3.90 ± 0.95	4.27 ± 0.73	2.80 ± 0.87-	2.86 ± 0.92*	2.73 ± 0.70	2.88 ± 0.85*
ApoA1	1.34 ± 0.14	1.32 ± 0.12	1.51 ± 0.15-	1.50 ± 0.17-	1.50 ± 0.15-	1.56 ± 0.11
ApoB	1.15 ± 0.10	1.19 ± 0.06	1.06 ± 0.11°	1.10 ± 0.11°	1.05 ± 0.08°	1.10 ± 0.14
Lp(a)	0.16 ± 0.07	0.18 ± 0.07	0.11 ± 0.05°	0.15 ± 0.07~	0.11 ± 0.06°~	0.13 ± 0.05°

Note: Compared with that of before treatment, °P<0.05, -P<0.01, \*P<0.001

5. The findings also indicated: apart from further reduction of Lp(a) level by 8-week Simvastatin treatment, lipid regulation effects of both medicines after 8 weeks treatment had no significant differences compared with that of after 4 weeks treatment.

### Discussion

The findings proved that the administration of 1.2 g/d Xuezhikang could dramatically reduce serum TC and LDL-C levels and the reduction margin was the same as that of Simvastatin. Past studies in China showed that the administration of 1.2 g/d Xuezhikang could decrease serum TC and LDL-C by 22% and 30% respectively.

The fact that Xuezhikang performs better in decreasing TG level is closely related to unsaturated fatty acids in Xuezhikang. It is known that unsaturated fatty acids can distinctly decrease serum TG and very low-density lipoprotein. It may have something to do with averagely higher TG level of Xuezhikang group than that of Simvastatin group. Some other study illustrates that the higher the TG concentration before treatment, the more significant Xuezhikang could reduce TG level.

Past domestic medical studies on Xuezhikang showed: the curative effect of Xuezhikang on TG reduction is better than on TC reduction. The findings of this study were just on the contrary. The different type of patients selected in the study possibly accounted for this phenomenon. The subjects in this study were only type IIa and IIb hypercholesterolemia patients. And no HDL-C elevation was observed in both Xuezhikang and Simvastatin treated groups as the sample may be too small. It was interesting to note that both Xuezhikang and Simvastatin could decrease the concentration of Lp(a).

In conclusion, Xuezhikang has nearly the same functions in reducing the concentrations of serum TC and LDL-C compared with Simvastatin, but performs better to decrease TG level than Simvastatin.

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