

Therapeutic effect of berberine on renal atherosclerosis.

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Abstract

Objective: To investigate the clinical effects of berberine treatment on renal atherosclerosis patients.

Methods: Ninety (90) renal atherosclerosis patients were recruited as study subjects. They were randomly divided into the control group and the treatment group. The control group was given routine blood pressure lowering and kidney-protection drugs. The treatment group received berberine. Blood Urea Nitrogen (BUN), Serum creatinine (Scr) and Triglycerides (TGs) were assayed. Renal function and blood lipid changes of patients in two groups were compared. Doppler ultrasound was used to measure Resistance Index (RI), PSV, and aorta PSV ratio.

Results: Compared with the control group, SCR and BUN levels decreased significantly in the treatment group ($p < 0.05$), showing that renal function of the patients improved. Serum total cholesterol TGs and Low Density Lipoprotein Cholesterol (LDL-C) levels were normalized, while RI, renal artery PSV, ratio of renal artery PSV and medium-sized artery PSV decreased. There were no significant differences between groups with respect to other indices ($p > 0.05$).

Conclusion: Berberine can effectively regulate the blood lipid profiles of renal atherosclerosis patients, and improve their renal function, thereby relieving the severity of the disease. Thus berberin may be of clinical significance in the diagnosis and treatment of renal atherosclerosis.

Keywords: Berberine, Renal atherosclerosis, Intervention, Renal function.

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Introduction

Renal atherosclerosis is a common multiple vascular disease with incidence increasing greatly year by year. The incidence of renal atherosclerosis is high in old people. Cerebral vascular diseases have multiple risk factors such as hypertension, hyperlipidemia, diabetes, cerebral vascular disease history, target organ injury and decreased mobility [1]. If blood pressure cannot be controlled effectively, it may cause renal atherosclerosis. If the disease is in progressive or advanced stage, it will lead to dysfunctional microcirculation, as well as heart, cerebral and renal organ lesions [2]. Other complications include high disability rate and high lethality rate from hypertension, hyperlipidemia and blood lipid metabolic disorders, all of which are life-threatening [2]. The main characteristics of renal atherosclerosis are non-inflammation in arterial wall, degenerative and hyperplasia disease. In renal atherosclerosis, lowering blood pressure and blood lipid (the evaluation indices) is vital for controlling further cervical artery sclerosis.

Berberine, also called berberine hydrochloride is an, isoquinoline alkaloid. Clinical pharmacology studies have shown that it regulates blood lipids, enlarges the coronary artery, and has been applied in treating hyperlipidemia and heart failure [3].

This study was aimed at evaluating the clinical effects of berberine treatment on patients with renal atherosclerosis as study subjects.

Materials and Methods

Clinical data

Ninety renal atherosclerosis patients on admission in Dongfang Hospital from July, 2016 to August, 2017 were recruited as study subjects. All patients met clinical criteria and were diagnosed with color Doppler ultrasound. The case records, manifestations and clinical signs of the patients were considered. There were 45 cases in the treatment group, consisting of 31 females and 14 males. The ages were from 55 to 71 y (mean age was 63.6 ± 3.8 y). There were 45 cases in the control group (28 females and 17 males), with ages in the range of 56 to 72 y (mean age was 62.3 ± 5.2 y). All included patients met diagnostic criteria of renal atherosclerosis, and were old people aged over 60 y old. Exclusive criteria concerned psychological patients who could not communicate normally with medical workers. All patients were approved by Ethics Committee and signed consent form. There were no obvious differences in sex and age between the two groups. Ethical approval for the study was given by the medical ethics

committee of Sixth People's Hospital of Qingdao with reference number: 2016022.

Treatment methods

All patients in two groups were given hospital routine treatment. The control group were treated with diuresis and blood pressure-lowering drugs, oral blood glucose-lowering drugs or insulin to lower blood glucose. In addition, aspirin and clopidogrel were given orally to treat cardiovascular diseases. The treatment group received orally 0.5 g berberine three times a day. All treatments lasted for 4 w. All patients were not permitted use of other blood lipid lowering drugs. Venous blood of patients in two groups was collected before and after treatment for biochemical analyses. Prior to examination, the patients were asked to do overnight fast and sleep well. Renal artery blood resistance indices, peak value in systolic period of renal artery and its ratio were measured by color Doppler ultrasound [4,5].

Biochemical analyses

Blood lipid profiles of patients in the two groups were monitored after overnight fast. The parameters measured were TC, TG and LDL-C.

Statistical analysis

Data are presented as mean \pm SD, and comparison between the two groups was done with t-test. Measurement data were compared using ANOVA, while recorded data were compared with SPSS 14.0 software. Statistical significance was assumed at $p < 0.05$.

Results

Biochemical indices

Compared with values before treatment, TC, TG and LDL-C levels decreased significantly in the treatment and the control groups after treatment ($p < 0.05$, Table 1).

Table 1. Values of lipid profile parameters in the two groups.

| Group | Treatment time | TC (mmol/L) | TG (mmol/L) | LDL-C (mmol/L) |
|---------------|------------------|-----------------|-----------------|-----------------|
| Control group | Before treatment | 6.43 \pm 0.30 | 2.43 \pm 0.40 | 3.91 \pm 0.29 |
| | After treatment | 5.12 \pm 0.19 | 2.17 \pm 0.29 | 3.56 \pm 0.38 |
| Treatment | Before treatment | 6.41 \pm 0.32 | 2.42 \pm 0.45 | 3.96 \pm 0.27 |
| | After treatment | 3.95 \pm 0.14 | 1.64 \pm 0.23 | 3.22 \pm 0.29 |

There were significant differences in SCR and BUN level of patients in the treatment group and control group ($p < 0.05$). These results are shown in Table 2.

Table 2. Effect of berberine on SCR and BUN in the two groups.

| Group | Treatment time | SCR (umol/L) | BUN (mmol/L) |
|-------|----------------|--------------|--------------|
|-------|----------------|--------------|--------------|

| | | | |
|-----------------|------------------|-------------------|------------------|
| Control group | Before treatment | 156.3 \pm 56.5 | 12.51 \pm 3.89 |
| | After treatment | 125.1 \pm 43.19 | 11.16 \pm 3.36 |
| Treatment group | Before treatment | 151.3 \pm 54.7 | 12.07 \pm 3.35 |
| | After treatment | 83.95 \pm 40.14 | 9.32 \pm 3.03 |

Indices of total arterial function

Values of resistance index and resistance ratio were significantly lower in the berberine-treated patients than in the control group ($p < 0.05$; Table 3).

Table 3. Various index results of total artery in two groups.

| Group | Treatment group | RI | PSV (cm/min) | PSV ratio |
|-----------------|------------------|-----------------|--------------------|-----------------|
| Control group | Before treatment | 0.93 \pm 0.18 | 200.43 \pm 30.40 | 3.98 \pm 0.99 |
| | After treatment | 0.78 \pm 0.15 | 182.17 \pm 35.29 | 3.26 \pm 0.68 |
| Treatment group | Before treatment | 0.91 \pm 0.16 | 203.27 \pm 29.45 | 4.06 \pm 1.19 |
| | After treatment | 0.55 \pm 0.13 | 141.64 \pm 39.20 | 2.02 \pm 1.29 |

Discussion

Atherosclerosis causes disorders in blood circulation in the cerebral artery. The present study has shown that disorder in lipid metabolism is one of the high risk factors for atherosclerosis [6,7]. The number of patients with atherosclerosis in China is high, and the incidence of this disease is also on the increase in China. The multiplicity of its pre-disposing factors is a big threat to health and quality of life. In this study, it has been shown that cervical atherosclerosis is complicated by various degrees of dyslipidemia. This creates difficulties in the clinical management of atherosclerosis. However, prompt control of the development of the disease can effectively arrest its clinical complications [8,9].

This results of this study showed that when compared with the situation before treatment, there were no significant differences between the control group and the treatment group with respect to TC, TG and LDL-C of patients ($p > 0.05$). However, after treatment, TC, TG and LDL-C values in the treatment group were significantly decreased, relative to the control group ($p < 0.05$). In addition, after treatment, SCR and BUN values of patients in the treatment group decreased significantly when compared with the control group ($p < 0.05$). Blood circulation value, resistance index and resistance ratio in the treatment group were lower in the treatment group than in the control group ($p < 0.05$). This shows that berberine can improve renal artery function of patients effectively. Therefore, for patients with cervical atherosclerosis and abnormal blood lipid profiles, the use of berberine can mitigate their condition and control blood lipids, thereby making for improved prognosis. Berberine is also non-toxic. The Doppler high-frequency color ultrasound method used for determination of blood circulation indices is non-invasive, simple and feasible. It has relatively high significance in clinical practice.

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