Application of statins in prevention and treatment of diabetes mellitus with atherosclerotic cardiovascular disease

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Abstract: Objective: To investigate the application of statins in the prevention and treatment of diabetes mellitus complicated with atherosclerotic cardiovascular diseases. Methods: 60 cases of diabetes mellitus complicated with atherosclerotic cardiovascular disease admitted to A hospital from May 2018 to May 2019 were selected and randomly divided into two groups. According to whether or not to use statins, patients were divided into normal control group (30 cases, no statins) and observation group (30 cases, adding statins on the basis of conventional treatment). Results: Statins can effectively reduce the levels of triglyceride, total cholesterol and LDL-C in diabetes mellitus patients with atherosclerotic cardiovascular disease. The increase of HDL-C level is more significant. To some extent, it can correct the lipid metabolism of patients. CONCLUSION: Strengthening and standardizing the use of statins can improve the therapeutic effect and give full play to its active therapeutic role in the prevention and treatment of atherosclerotic cardiovascular diseases.

1. Introduction

According to statistics, in 2016, an estimated 500 million people worldwide suffer from diabetes. Cardiovascular disease is the main complication of diabetes mellitus patients. If the disease is not well controlled, it is easy to induce complications such as atherosclerotic cardiovascular disease, which poses a threat to the health of patients and is an important cause of death in recent years [1]. Generally speaking, most people have good tolerance to statins, and their adverse reactions are usually short-term and mild, dose-dependent and safe. Relevant studies have proved that the incidence of cardiovascular disease is higher in diabetic patients, and it will increase the risk of treatment. The incidence of cardiovascular disease is related to the level of blood sugar, abnormal lipid metabolism and disorders [2]. In addition, hyperglycemia can increase oxidative stress in the human body, activate nuclear factors closely related to the synthesis of inflammatory factors, leading to vascular endothelial dysfunction, thereby further aggravating atherosclerotic lesions [3]. Comprehensive management strategies should be adopted to comprehensively manage various cardiovascular risk factors while controlling blood glucose. Specific measures include lifestyle intervention, blood pressure reduction, lipid regulation, antiplatelet therapy, weight loss, etc., in order to minimize cardiovascular events. And the risk of death. Significant reductions in blood LDL-C levels through the use of statins can significantly reduce the mortality and major cardiovascular events in patients at high risk for atherosclerosis. The positive effects of statins on primary and secondary prevention of CVD in diabetic patients are well defined [4].

The characteristics of abnormal lipid metabolism in diabetic patients are that the levels of triglycerides and apolipoproteins increase significantly, and the levels of low density lipoprotein cholesterol may not be high. Insulin resistance makes very low density lipoprotein cholesterol (VLDL-C) abnormal blood glucose (GBG) affect blood lipid metabolism in patients to a certain extent, and abnormal blood lipid metabolism is one of the independent risk factors of coronary heart disease [5]. Statins are commonly used in clinic to regulate blood lipid, which can effectively reduce the risk of cardiovascular events in patients with dyslipidemia. In diabetes mellitus with atherosclerotic cardiovascular disease, the use of statins plays an active preventive role. In order to improve the therapeutic effect, there are few reports on the use of statins in diabetes mellitus with atherosclerotic cardiovascular disease, and there is no strong evidence-based basis [6]. Mittleman

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MA et al. reanalyzed the data of WOSCOPS and used standard clinical diagnostic criteria for diabetes. After using pravastatin, the risk of diabetes showed the same trend, but it was not statistically significant, rather than the initial report. The risk is reduced [7]. Analyze the application of statins in diabetic atherosclerotic cardiovascular disease. And fully understand the comprehensive management strategy of T2DM combined with ASCVD patients, the principle of hypoglycemic treatment, the goal of blood glucose control and the rational application of commonly used hypoglycemic drugs. The consensus was developed by my domestic secretory department, cardiology department, nephrology department and clinical epidemiologists [8].

2. Materials and Methods

2.1 General information

Sixty patients with diabetes mellitus and atherosclerotic cardiovascular disease admitted to hospital A from May 2018 to May 2019 were selected. The patients were divided into control group and observation group by random number method. Inclusion criteria: In accordance with the diagnostic criteria of diabetes in the Guidelines for the Prevention and Treatment of Diabetes in China published by the Diabetes Society of the Chinese Medical Association, it conforms to the diagnostic criteria of atherosclerotic cardiovascular diseases in the Guidelines for Clinical Diagnosis and Treatment of Abnormal Glucose Metabolism and Atherosclerotic Cardiovascular Diseases published by the Epidemiology Group of the Cardiovascular Diseases Society of the Chinese Medica Exclusion criteria: (1) Chronic liver disease, severe renal insufficiency; (2) Severe respiratory diseases, malignant tumors, peptic ulcer; (3) Adverse reactions to statins; (4) Recent (3 months) Acute myocardial infarction, acute coronary syndrome, stroke and so on. (5) Pregnant women, patients with severe disabilities or other diseases that cannot be followed up regularly; Patients who are using thyroid drugs and other drugs that affect blood lipid metabolism (such as various hormone preparations, oral contraceptives, etc.). Researchers strictly confirmed the clinical diagnosis of all subjects before selecting them for this study by checking their identity certificates and medical records. All subjects signed informed consent forms.

2.2 Method

The mechanism by which statins increase the risk of new-onset diabetes is still uncertain. The main characteristics of diabetes mellitus are islet beta cell dysfunction and insulin resistance in skeletal muscle, adipose tissue and liver. All the patients in this study were screened, and the initially identified patients were invited for outpatient diagnosis. The patients who confirmed the condition and participated in this study were managed by a unified physician in charge. The patients in the control group were treated with basic drugs instead of statins. Patients in the observation group were treated with statin drugs on the basis of the control group, including atorvastatin 10-20 mg/d, simvastatin 40-80 mg/d or fluvastatin 40-80 mg/d; data were used ($x\pm s$) indicates that using the t test, $P>0.05$ represents a statistically significant difference.

3. Results

Because statins have an undoubted protective effect on cardiovascular system, and the absolute risk of newly-added diabetes is much lower than that of cardiovascular protection. The influencing factors of statins in diabetes mellitus with atherosclerotic cardiovascular disease were analyzed. The history of diabetes mellitus, essential hypertension, peripheral vascular disease and statins in patients with diabetes mellitus were analyzed. The utilization rate had no significant effect ($P > 0.05$). Compared with the control treatment group, the levels of triglyceride, total cholesterol and LDL-c in the observation group decreased more significantly, and the level of HDL-c increased more significantly (p < 0.01). The comparison of blood lipid changes between the two groups before and after treatment is shown in Table 1.

Table 1 Changes of blood lipids before and after treatment in two groups

Index	Control group(30 cases)	Observation group(30 cases)	P
Triglyceride(mmol/ L)			
Before treatment	2.26±0.31	2.07±0.26	0.235
After treatment	2.23±0.42	1.56±0.32	0.001
Total cholesterol(mmol/ L)			
Before treatment	5.69±0.73	5.23±0.41	0.147
After treatment	5.48±0.39	4.25±0.53	0.001
HDL－C(mmol/ L)			
Before treatment	0.81±0.23	0.75±0.18	0.657
After treatment	0．93±0.30	1.25±0.38	0.001
LDL－C(mmol/ L)			
Before treatment	3.41±0.75	3.59±0.63	0.635
After treatment	3.58±0.62	2.49±0.58	0.001

4. Discussion

At the same time of routine treatment of heart failure, good diabetes care is conducive to improving the symptoms of patients with cardiac insufficiency, improving the nutritional status of patients scientifically and effectively, and reducing the incidence of malnutrition for the rehabilitation of the disease. In the aspect of blood sugar management, clinicians should fully consider the balance between the efficacy and safety of hypoglycemic drugs, and fully understand the cardiovascular safety of commonly used hypoglycemic drugs, so as to master its application principles skillfully. Therapists should introduce to patients the necessity and importance of statin use, inform patients of adverse reactions after use, and eliminate patients'medical misunderstandings and misunderstandings in statin treatment. When statin-related adverse muscle or liver reactions occur, most patients will not suffer permanent injury after proper treatment such as correcting controllable risk factors, reducing or discontinuing doses, and replacing other statins. However, different statins and different doses may have different effects on Lp(a). After all, the apolipoprotein A gene single nucleotide polymorphism is closely related to Lp(a) level. In clinical practice, it is necessary to strengthen the control of blood lipid levels in such patients, further reducing the risk of cardiovascular events in patients.

Diabetes mellitus combined with atherosclerotic cardiovascular disease has a greater threat to human health. Statins can significantly improve the status of patients with atherosclerotic cardiovascular disease, alleviate clinical symptoms, and effectively control the patient's condition. Cardiovascular disease and diabetes are common soil, such as obesity, metabolic syndrome and so on. Patients who use statins should pay more attention to improving their lifestyle and reasonable diet. Statins, a hydroxymethyl glutaric acid monoacyl coenzyme A reductase inhibitor, reduce cholesterol synthesis by competitive inhibition of endogenous cholesterol synthesis rate-limiting enzymes, while stimulating the increase in the number and activity of low density lipoprotein receptors on the cell surface, further contributing to the reduction of cholesterol. The use of statins in clinic plays an active role in preventing the occurrence and development of these diseases. The statin 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor has the characteristics of easy absorption, long half-life, no metabolic conversion in vivo, high bioavailability, and is applied to hyperlipemia treatment in clinic. Although statins have the potential to increase new-onset diabetes and aggravate diabetes, this risk is very small compared to the benefits of high-risk cardiovascular risk, including diabetes, in preventing and treating ASCVD, and is not sufficient to become a statin. Drug barriers. In general, when statins are reduced or stopped, liver enzymes can return to normal. Even if the dose is not adjusted, 70% can be reduced by itself, which is usually transient liver enzyme abnormality. Secondly, muscle injury leads to myolysis, which can lead to renal failure in

severe cases. However, the incidence rate of myolysis is very low, which is a few tenths of a thousandth, and the increase of myosin is related to the excessive dosage of statin.

In the myocardium damaged by various pathological factors, the fine structure of the heart has undergone pathological changes and abnormal myocardial function. The gradual enlargement of the left ventricle, the decrease of the systolic and diastolic functions of the left ventricle lead to the decrease of the ejection capacity of the heart, which can not normally complete the metabolic function of the heart. The myocardium needs to meet the needs of the body through other compensatory changes. Risk of ASCVD The use of different intensity interventions is the core strategy for the prevention and treatment of dyslipidemia. The overall cardiovascular risk assessment is the basis for decision making for dyslipidemia. The effects of statins on low-density lipoproteins are inconsistent, but they have inconsistent effects on Lp(a), which has similar lipid components to low-density lipoproteins. The cause of this contradiction may be related to the unique molecular structure and biological properties of Lp(a). The core goal of adopting lipid management is to reduce the risk of ASCVD risk. In these guidelines, for the management of blood lipids in diabetic patients, it is recommended to first conduct cardiovascular risk stratification, and patients with high risk of diabetes (with 0 to 1 cardiovascular risk factors other than diabetes) receive LDL when receiving statin therapy. The -C target value is 100 mg/dL (2.6 mmol/L).

Although metabolic disorders of blood glucose and lipid are recognized as important risk factors for the occurrence and development of CHD, the effects of metabolic disorders of blood glucose on the specific pathophysiological processes of oxidative modification of Lp (a) and enzymatic degradation and on the efficacy of statins are still unclear. Statin-related adverse muscle reactions can be divided into (1) myalgia: symptomatic but normal levels of creatine kinase (CK); (2) myopathy: symptomatic with elevated CK but less than 10 times the upper limit of normal value; (3) rhabdomyolysis: symptomatic and CK > 10 times the upper limit of normal value. Statins can effectively reduce the levels of TG, TC and LDL-C in diabetic patients with atherosclerotic cardiovascular disease, improve the level of HDL-C, and correct the lipid metabolism to a certain extent. The use of drugs can inhibit the synthesis of 3-hydroxy-3-methylglutaryl coenzyme A reductase, thereby reducing cholesterol synthesis, lipid accumulation, and accelerating the metabolism of low-density lipoprotein in the blood, thereby reducing blood lipid levels in the body. Tissue plaque formation and fixation. Mitochondrial dysfunction in islet beta cells, skeletal muscle, and adipose tissue is also closely related to the development of insulin resistance and diabetes. Attention to cardiovascular safety issues, and priority is given to choosing hypoglycemic drugs with evidence of cardiovascular benefit. Changes in myocardial synchrony at different stages prevent the ventricles from pumping blood efficiently and effectively. Myocardial synchrony is caused by various complicated factors, which can cause myocardial ischemia, hypoxia and damage, resulting in decreased myocardial sensitivity and affecting patients' quality of life.

5. Conclusion

Diabetes mellitus is a common metabolic disease, mainly due to the absolute or relative insufficiency of insulin, resulting in increased blood sugar in patients. In this paper, the application of statins in the prevention and treatment of diabetes mellitus with atherosclerotic cardiovascular disease was studied. The best way to improve the health of patients is to formulate a nutritional dietary guidance program according to the actual situation of patients'nutritional status and the degree of their illness, and increase the intake of nutrients by patients themselves, which is conducive to improving the malnutrition of patients. Strengthen and standardize the use of statins can improve the therapeutic effect, and give full play to its active role in the prevention and treatment of atherosclerotic cardiovascular diseases. The statin is suitable for almost all people with diabetes. It can improve the clinical efficacy by reducing the blood lipid, blood pressure and carotid plaque grading. The results of this study have important reference for the application of clinical drugs. The safety of the correct application of statins under the guidance of a doctor has also been fully confirmed. Strengthen the training of physicians and health education for patients, and strive to narrow the gap between clinical practice and evidence-based medical evidence and

guidelines, in order to better improve the clinical prognosis of patients with diabetes and atherosclerotic cardiovascular disease.

References

[1] Dong Y H, Lin J W, Wu L C, et al. Examining the association between statins and lung cancer incidence in patients with type 2 diabetes mellitus[J]. Journal of the Formosan Medical Association, 2014, 113(12):940-948.

[2]Benes L B,Bassi N S,Davidson M H. The Risk of Hepatotoxicity, New Onset Diabetes and Rhabdomyolysis in the Era of High-Intensity Statin Therapy: Does Statin Type Matter? [J]. Progress in Cardiovascular Diseases, 2016, 59(2):145-152.

[3] Wang C C L, Hess C N, Hiatt W R, et al. Clinical Update: Cardiovascular Disease in Diabetes Mellitus: Atherosclerotic Cardiovascular Disease and Heart Failure in Type 2 Diabetes Mellitus – Mechanisms, Management, and Clinical Considerations[J]. Circulation, 2016, 133(24):2459-2502.

[4] Steen D L, Khan I, Becker L,et al. Patterns and predictors of lipid-lowering therapy in patients with atherosclerotic cardiovascular disease and/or diabetes mellitus in 2014: Insights from a large US managed-care population[J]. Clinical Cardiology, 2017, 40(3):155-162.

[5] Navarese E P, Szczesniak A, Kolodziejczak M, et al. Statins and Risk of New-Onset Diabetes Mellitus: is there a Rationale for Individualized Statin Therapy?[J]. American Journal of Cardiovascular Drugs, 2013, 14(2):79-87.

[6] Dobre D, Rossignol P, Murin J, et al. Statin therapy and clinical outcomes in myocardial infarction patients complicated by acute heart failure: insights from the EPHESUS trial[J]. European Journal of Heart Failure, 2013, 15(2):221-227.

[7] Mittleman M A, Taylor W C, Smetana G, et al. Treatment of Blood Cholesterol to Reduce Risk for Atherosclerotic Cardiovascular Disease: Grand Rounds Discussion from the Beth Israel Deaconess Medical Center[J]. Annals of Internal Medicine, 2016, 163(4):280-90.

[8] Lars Køber. Impact of aspirin and statins on long-term survival in patients hospitalized with acute myocardial infarction complicated by heart failure: an analysis of 1706 patients[J]. European Journal of Heart Failure, 2014, 16(1):95-102.