

# Research Progress on Different Dietary Patterns in the Control of Diabetes

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**Abstract.** Diabetes is a group of metabolic diseases caused by genetic and environmental factors, which is characterized by chronic hyperglycemia. It is a common and frequent disease, and a worldwide public health problem that seriously threatens human health. As a chronic disease that requires long-term medication, diabetes and complications consume a lot of medical resources, seriously affecting people's quality of life and bringing a huge economic burden to the global health system. Therefore, more and more researchers have begun to study how to treat diabetes through diet. This article combines the three dietary methods of DASH diet, low GI diet and traditional Chinese medicine diet, analyzes their similarities and differences, advantages and disadvantages, and draws the following conclusions: eating more whole grains, drinking more low-fat or skim milk, and reducing the amount of fat in the diet will be conducive to the control of diabetes. Diabetes can be controlled through a reasonable diet, which brings hope to diabetics.

**Keywords:** Diabetes; DASH Diet; Low GI Diet; traditional Chinese medicine diet.

## 1. Introduction

Diabetes is a disease of carbohydrate, protein and fat metabolism disorders caused by absolute or relative insulin deficiency and/or insulin utilization disorders. In 2019, the World Health Organization updated the classification of diabetes to six types, namely, type 1 diabetes, type 2 diabetes, mixed diabetes, other special types of diabetes, unclassified diabetes, and gestational diabetes [1]. In China, type 2 diabetes is common, accounting for more than 95% of diabetics. The causes include insulin resistance, insufficient insulin secretion or both [1]. Therefore, the main research subjects in this article are patients with type 2 diabetes. China is a large country with diabetes, with an adult diabetes prevalence rate of 12.8% and an estimated 130 million patients.

Diabetes is characterized by a long course of disease, many complications and a serious condition. Long-term chronic hyperglycemia can cause damage to tissues and organs such as eyes, nerves, kidneys and cardiovascular. In addition, a series of complications also endanger human health. Therefore, it is very important to explore how to treat and control diabetes. Since the discovery of medical insulin, diabetes has been well controlled and treated through hypoglycemic drugs, namely insulin supplements, combined with dietary control. Recently, some researchers have also made progress in diabetic diet control. The adoption of a DASH diet may lead to drastic changes in insulin demand, which is of great benefit to type 2 diabetes that requires insulin therapy [2]. The low GI diet significantly improves blood sugar control, reduces BMI and total body fat, thus promoting healthy weight loss [3]. Traditional Chinese medicine diet with syndrome differentiation and diet as the core can choose foods or drugs with different characteristics for diabetic patients with different constitutions, which can effectively improve the blood sugar level of patients [1]. One in ten people in China are full of diabetes, which also means that there are more families behind them. Early diabetes is not easy to detect, and the symptoms are serious and deserve great attention.

In recent years, with the changes in the lifestyle and dietary structure of Chinese residents, the prevalence of diabetes has increased significantly, seriously endangering the health of residents, which is an important public health problem facing China at present. How to alleviate the pain of diabetics so that they can eat well and eat well is the focus of the current research. This article will

combine a variety of dietary methods to control diabetes, study the control mechanism of diabetes, and put forward new dietary suggestions.

## 2. Diet and Type 2 Diabetes

Type 2 diabetes is the most common type of diabetes. This disease is caused by a continuous increase in blood sugar levels due to insufficient insulin secretion in the body or the inability of the human body to use insulin effectively. In a hyperglycemic environment, it is easy to cause the lesions of large blood vessels, microvessels, nerves and other tissues, thus endangering the heart, kidneys, eyes and other organs. The typical symptoms of type 2 diabetes are often referred to as "three more and one less", that is, patients need to drink a lot of water, eat a lot, urinate more, and lose weight. However, many early patients usually have no symptoms or only mild symptoms. Because of this, some people will not find the disease before chronic complications or routine physical examination. In addition, due to abnormal metabolism, many patients will feel weak and prone to fatigue. Type 2 diabetes may be combined with cardiovascular and cerebrovascular diseases and digestive tract dysfunction to cause more symptoms, but these symptoms can disappear by controlling blood sugar and primary diseases. Type 2 diabetes can also cause some psychological symptoms. Most patients have emotional instability, anxiety, depression, and may also have insomnia, dreaminess, easy to wake up and other symptoms.

Common causes of diabetes include genetic factors, lifestyle, health status, etc. Genetic factors account for only 10% of the overall factors that induce diabetes. Poor lifestyle is an important factor leading to type 2 diabetes, such as insufficient physical activity and smoking. Diet is also an important factor affecting the risk of type 2 diabetes. Drinking too many sugary drinks will increase the risk of disease. Eating a lot of white rice also seems to increase the risk of disease. Fat intake in the diet is also a very important factor. Saturated fats and trans fats increase the risk of disease, while polyunsaturated fats and unsaturated fats help reduce the risk. In addition, many health problems and drugs may also increase the risk of diabetes.

### 2.1. DASH Diets

The DASH diet was developed in the diet method proposed by the United States in 1997 to prevent hypertension. The study found that as long as you can maintain enough potassium, magnesium and calcium plasma intake by ingesting enough vegetables, fruits and low-fat (or skim) milk in the diet, and minimize the intake of fat (especially animal oils rich in saturated fatty acids), blood pressure can be significantly reduced. The dietary principle of the DASH diet is to eat more whole grains and vegetables, and eat lean poultry and fish moderately; if patients like sweets, eat more fruits and refuse desserts; limit the intake of salt, and replace excess salt with seasonings such as peppers and lemons. The DASH diet consumes less fat and saturated fat, more fiber and protein, which will lead to a decrease in people's daily insulin demand, lower fasting blood sugar, higher insulin sensitivity index, and a decrease in urine sugar [2]. At the same time, total cholesterol, high-density lipoprotein and low-density lipoprotein cholesterol will also decrease [2]. The Chinese modified terminating hypertension diet (DASH) diet is the best diet plan designed for Chinese patients. It is an improved DASH diet model based on the dietary characteristics of Chinese residents, which can improve the risk factors of disease development, ensure the improvement of intervention effect, and restore the nutritional status of patients [4]. Compared with the standard DASH diet, the Chinese modified DASH diet contains less fat, saturated fat and calories, which is more in line with Chinese eating habits [4]. Improved DASH diet has obvious effects on improving hypertension, blood pressure in diabetic patients, 2h blood sugar after meals, waist circumference, BMI, body quality and blood lipid index level [4].

Therefore, from the DASH diet, it can be seen that eating more whole grains and vegetables, and eating less fat and more protein will help control diabetes.

## 2.2. Low GI Diet

In recent years, the research on the GI value of food has been deepening. As an effective indicator to evaluate the changes in blood sugar after food intake, GI value reflects the impact of different foods on the body's blood sugar after meals. The speed and degree of blood sugar increase caused by different types of carbohydrates in the diet are different. It can be measured by the blood glucose production index GI, which means that the increase in the area under the blood glucose curve within 2 to 3 hours after the intake of a constant amount of food is divided by the intake of 50g of glucose, reflecting the content of different foods. The relative ability to improve the speed of blood sugar when the sugar amount is the same.

A high GI diet can lead to a rapid rise in blood sugar levels, causing blood sugar fluctuations. Acute hyperglycemia can cause short-term vasoconstriction of small arteries, which is the main cause of microvascular and macrovascular complications in diabetic patients. Low GI foods take a long time to digest in the gastrointestinal tract. After entering the blood, the glucose peak will be very low and the rate of decline will be relatively slow, which can help diabetics improve the postprandial blood sugar and insulin response, reduce the peak postprandial blood sugar peak, and can prolong the feeling of fullness, which can reduce the risk of type 2 diabetes and other heart metabolic diseases [5]. Therefore, in the nutrition management of diabetes, more and more studies recommend the use of low GI foods instead of high GI foods as the main carbohydrate source. Low GI food refers to foods that contain available carbohydrates and the glycemic index (GI) is less than 55% (including). The consumers of low GI food are mainly people who want to control blood sugar and weight. Low GI food is characterized by carbohydrates, slow digestion, slow sugar, and strong sense of fullness; it is conducive to blood sugar control, maintaining blood sugar stability, and reducing insulin demand; it is conducive to weight control and vascular health. Low GI food is not only the first choice for people with blood sugar, blood lipids, blood pressure abnormalities and people who lose weight, but also the best food that healthy people can eat together every day. The scope of low GI food mainly includes grain processed products, milk and dairy products and other foods containing available carbohydrates. This is only the range of low GI foods, but it does not mean that these foods are low GI foods. Whether these are low GI foods ultimately need to be determined by human blood glucose measurement experimental data. Studies have shown that eating low GI foods can significantly improve blood sugar control and reduce BMI and total body fat [3]. The low GI diet can also improve the feeling of fullness and control energy intake. The postprandial insulin response of low GI meals may affect short-term appetite, so it will reduce the intake of the next diet and reduce appetite [5]. Therefore, GI can be used to guide diabetics to choose food and control their weight. For diabetics, GI value can be used to reasonably choose a diet and adjust the diet structure to control blood sugar.

It can be seen that eating beans, milk and a small amount of processed coarse grains is very beneficial for diabetic patients.

## 2.3. Traditional Chinese Medicine Diet

The traditional Chinese medicine diet with "dialectical feeding" as the core is a non-drug recovery method based on the theory of traditional Chinese medicine, emphasizing different feeding programs according to physique, etiology and symptoms. Traditional Chinese medicine believes that different syndromes of the same disease may appear at different stages of development; and different diseases may have the same syndrome types during their development. Therefore, the principle of "same disease and different treatment" or "same treatment of different diseases" can be adopted respectively. This has a significant effect on recontaining spirit and blood, balancing human nutrition, and assisting in the prevention of diseases. For diabetics with different constitutions, choosing foods or drugs with different characteristics can effectively improve the blood sugar level of patients [1]. Its advice for diabetics is to have a variety of diets, suitable energy, and give priority to whole grains and hypoglycemic index foods and light diets and so on. In addition, many drugs commonly used in traditional Chinese medicine also have miraculous effects on diabetes. Huanglian soup can improve type 2 diabetes through a variety of targets and ways [6]. The medicinal parts of mulberry include

leaves, branches, root skins and fruits, which have a significant hypoglycemic effect [7]. Liuwei Dihuang Pill (LWP), a classic traditional Chinese medicine formula, has also been widely used to treat diabetes and its complications, with remarkable therapeutic effect and fewer side effects [8].

### 3. Discussion

The commonality of these three diets is to eat more whole grains, drink more low-fat or skim milk, and reduce the amount of fat in the diet. They can not only maintain sufficient potassium, magnesium and calcium plasma intake, but also effectively reduce blood pressure, and also cause a drop in people's daily insulin demand, fasting blood sugar, insulin sensitivity index and urine sugar, which is conducive to blood sugar control and maintaining blood sugar stability; it is conducive to blood vessel health; it can also improve the feeling of fullness and control energy intake; insulin response after meals may also affect short-term appetite, so it will reduce intake of the next diet and reduce appetite. At the same time, some studies show that there is a consistent relationship between high whole grain intake and reducing the risk of type 2 diabetes [9]. In terms of fat, in addition to reducing the amount of fat in the diet, especially animal fat rich in saturated fatty acids, it is also necessary to increase polyunsaturated fatty acids and low cholesterol foods, which is beneficial to diabetes [10].

### 4. Conclusion

Each of these three diets also has its own advantages and disadvantages. The DASH diet emphasizes high potassium, high magnesium, low sodium and low sugar, and reduces sodium salt intake through high electrolyte intake, so as to achieve the effect of lowering blood pressure. However, it requires people to eat a lot of plant food, which may cause gastrointestinal discomfort. Low GI food has a wide range, which is both its advantages and disadvantages. On the one hand, it means that people have more choices, and on the other hand, it also means that people may eat more and lose their effect. The diet of traditional Chinese medicine is different from the above two diet methods. It points out the specific food that has an effect on the treatment of diabetes and the right medicine. The disadvantage is that it is inconvenient for patients to recuperate at home. It may be better if the above diet methods can be improved and integrated according to the eating habits and local environment of different countries and regions.

At the same time, patients can also find their own doctors to customize their own recipes according to their own situation, which is more targeted. This article explores how to control and treat diabetes from the perspective of diet, analyzes several popular diet methods on the market, and provides new ideas for the study of diabetes treatment methods, so that people can easily face the disease while eating happily, which will also reduce patients' anxiety. However, there are also many diets that are not mentioned in the article, such as ketogenic diet, Mediterranean diet, flexitarian diet, etc. Looking forward to the exploration of subsequent researchers. As people's quality of life improves, people will pay more and more attention to healthy diet. With the development of science and technology, more foods beneficial to diabetes will be found. Diabetes has such a large group of patients and serious symptoms, which requires more people's attention and research, and strive to find a cure as soon as possible.

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