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# Advances in Nutritional Interventions for Patients with Diabetes Mellitus

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## ABSTRACT

With the accelerated aging process in China, there are more and more diabetic patients, especially the elderly. The function of pancreatic β-cells in the elderly body gradually declines, insulin secretion ability decreases, and blood glucose regulation ability is weakened. In addition, the body's tolerance to glucose decreases, easily triggering diabetes. The high prevalence of diabetes mellitus and the high number of risk factors make it easy to cause various complications. Based on this situation, in recent years, the research on the treatment and care of diabetic patients has also made good progress, basically favoring nutritional intervention, which is more effective and less likely to induce adverse reactions, and is a more popular intervention. Therefore, this paper will synthesize the research results of scholars at home and abroad, discuss and analyze the research progress of nutritional intervention in diabetes mellitus patients, and provide certain references and reference for the dietary care of diabetes mellitus patients in the future.

## KEYWORDS

Diabetes mellitus; Nutritional intervention; Research progress

## 1. OVERVIEW OF DM

Diabetes mellitus (DM) is a common chronic metabolic disease that is more prevalent in the elderly population. Older adults are more susceptible to diabetes because of physiological changes such as slower metabolic rate and weakened immune function [1]. This disease is usually caused by insufficient insulin secretion or impaired insulin action, and may be affected by a variety of factors such as genetics, lifestyle, and dietary habits, with elevated blood glucose being one of its main hallmarks [2]. Although “three more and one less”, i.e., drinking more, eating more, urinating more, and losing weight, are the common clinical manifestations, some people may only show mild discomfort, such as fatigue, loss of vision, or dry and itchy skin, etc., which can significantly affect the nutritional intake and health status of diabetic patients, while others do not have any discomfort at all [3]. Currently, the mainstay of treatment is regular monitoring of fasting and 2-hour postprandial blood glucose under the guidance of a specialist, scientific and rational dietary arrangements, emotional relief, and the use of hypoglycemic drugs as prescribed by the doctor [4]. Most diabetic patients are admitted to hospitals because of worsening symptoms, such as skin ulcers, which can lead to aggravation of symptoms and delayed treatment, and delayed treatment may cause serious complications [5]. Reasonable dietary habits and personalized diet plans can help diabetic patients effectively control blood glucose, reduce symptoms, lower the risk of complications and improve quality of life.

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## 2. CURRENT STATUS OF RESEARCH AT HOME AND ABROAD

With the continuous deepening of medical level, nutritional intervention for diabetic patients has attracted more and more widespread attention. Domestic research started late, and research on nutritional intervention for diabetic patients has gradually gained attention in recent years. Studies have shown that there is no significant association between dietary calcium, potassium, magnesium and selenium intake and diabetes mellitus in the overall population, however, gender subgroup analyses have shown that calcium Q2 intake is associated with a reduced risk of diabetes mellitus in both men and women [6]; In addition to this, carbohydrate intake of diabetes mellitus patients should be controlled at about 200 grams per day, which can be supplemented with cholesterol through the consumption of foods such as porcine liver and animal kidney, etc.,. Attention should also be paid to the intake of vitamins and minerals [7]. Diabetic patients should control the interval between three meals a day to about 5 hours, and ensure that the total daily calories account for about 55% of carbohydrates, 25% of fats, and 20% of proteins. At the same time, enough fiber-rich foods and trace elements should be consumed to maintain the nutritional balance of the body and balance the intake of various nutrients [8].

Foreign research started earlier, with more mature research methods and research results. For example, some studies have shown that the addition of D-isomorphic sugar (low-calorie D-3-fructose isomers) to the dietary nutrition of three meals has a significant inhibitory effect on hyperglycemia that occurs after meals [9]; some researchers have found that vegan diets have shown significant effects in the glycemic management of diabetic patients [10]; there are also studies on the intake of optimal cookies rich in a variety of nutrients from composite flours, which are used to improve the nutritional intake of diabetic patients without affecting their blood glucose levels [11].

Currently, domestic and international research on diabetes nutrition intervention mainly focuses on dietary structure adjustment and other aspects. Its research population has limitations, with the main research subjects in foreign countries being Europeans and the main research subjects in China being Asians. Future studies need to further explore a more general, scientific, rational and individualized nutritional program for diabetes with long-term follow-up and large-scale clinical validation to provide more adequate evidence support. The aim of this study was to review the nutritional interventions for diabetic patients in past studies and provide ideas for glycemic control in diabetic patients.

## 3. THE ROLE OF NUTRITIONAL INTERVENTIONS IN THE TREATMENT OF DIABETES MELLITUS

Dietary habits are closely related to changes in blood glucose levels, and different dietary structures and eating habits can lead to differences in calorie intake. Nutritional interventions equalize daily energy intake to avoid excessive energy intake, and in the process of safeguarding a healthy diet, blood glucose can also be controlled [12]. Nutritional interventions can help to improve the immune function of patients, as well as promote their nutritional status and self-efficacy [13]. Low-carbohydrate or very low-carbohydrate dietary interventions have been shown to be beneficial for diabetic patients and can help them control their blood glucose [14]. Nutritional interventions can also help diabetic patients to lose weight, and moderate weight loss (5%-10%) has a significant effect on improving insulin resistance and lowering blood glucose, blood lipids, and blood pressure, which can benefit them in changing the course of the disease [15]. In addition to this, nutritional interventions can reduce the risk of complications in diabetic patients through several mechanisms. For example, studies have shown that blood glucose levels are significantly correlated with vitamin D levels and diabetic complications, and the higher the blood glucose level, the lower the vitamin D level; Vitamin D has the effect of reducing the occurrence of cardiovascular disease, reducing arterial endothelial damage, alleviating inflammation, and regulating neurological and immune functions,

and studies have found that the reduction of its level is an influencing factor of diabetic complications [16]. Nutritional intervention for diabetic patients can not only improve the nutritional status of individuals, but also significantly improve their quality of life. Individualized nutritional care can effectively improve blood glucose levels and reduce the incidence of adverse pregnancy outcomes in patients with gestational diabetes mellitus (GDM), and the quality of life of patients with gestational diabetes mellitus was significantly improved through scientific dietary modifications and lifestyle interventions that benefit women with GDM and their infants [17]. Nutritional interventions are important in the pre-diabetes (SwP) stage. Long-term studies have shown that this stage is a critical period for preventing the transformation of diabetes into a chronic disease. The development of diabetes can be effectively delayed or reversed through rational dietary control and lifestyle intervention [18]. Nutritional intervention has a multifaceted positive role in the treatment of diabetes mellitus, has obvious prevention and control of diabetes mellitus, is the basic content of the intervention of lifestyle habits and other aspects, is an indispensable part of the management of diabetes mellitus, and the value and significance of it is very obvious.

## 4. NUTRITIONAL INTERVENTION FOR DIABETIC PATIENTS

Patients with diabetes mellitus should have a reasonable intake of food according to their standard body weight and activity intensity, maintain nutritional balance and avoid starvation. In the diet of diabetic patients, the calories of three meals should be distributed according to the body's activity pattern of the day, and the corresponding standards of “morning, midday and evening” meals are “good, full and less”. Some studies have shown that lowering the carbohydrate intake of diabetic patients can relieve anxiety and depression and improve their quality of life. For diabetic patients, carbohydrates should account for 45% to 60% of total energy intake, following the principles of separating wet and dry food, combining coarse and fine food, at the right temperature, roughly processed, and avoiding frying. In order to control blood glucose, Asians should limit the amount of staple food to 150-200 grams to meet the body's demand for carbohydrates while avoiding excessive breakdown of fats and proteins. In addition, 100-150 grams of lean meat per day can be consumed, and poultry with low fat content can be chosen. The amount of meat consumed per day should be equivalent to the size of the palm of the hand and the thickness of the little finger. Diabetic patients should not consume more than 25-30 grams of fats and oils per day, as excessive intake may lead to cardiovascular diseases. Fatty meat and meat oils are high in energy and fat and should not be consumed in excess. If conditions permit, you can eat more fish rich in high quality protein in moderation. Elderly patients have lower muscle mass, and adequate energy intake can avoid muscle protein hydrolysis, so protein intake can be increased as appropriate. In addition, 300-500 grams of vegetables can be consumed every day, preferably about half of them are dark green vegetables. Drinking 1200-1500 ml of water per day and choosing alkaline water can effectively control the blood glucose level of diabetic patients [19-22]. What kind of beverages can diabetics drink? Regarding this question, some studies have shown that plant compound drinks (composite drink of Cymbopogon flexuosus, mulberry leaf and Chinese yam) do have the efficacy of controlling blood glucose, but its experimental subjects are not human beings for the time being, and it has only been done in mice [23]. Vitamin D deficiency is common in diabetic patients, so vitamin D supplementation can be appropriate [24]. An important practice in Chinese medicine is the combination of “food” and “herbs” to form a herbal diet. It integrates the treatment of diabetes into daily dietary behavior, replacing the “injection and medication” of Western medicine with “eating and drinking”, so that the dietary control of diabetic patients is transformed into a kind of health concept and a habit, and the dietary system of traditional Chinese medicine can be used for the treatment of diabetic patients, and the dietary system of traditional Chinese medicine can be used for the treatment of diabetic patients. The dietary application system of traditional Chinese medicine can effectively alleviate patients' emotions [25].

## 5. CONCLUSION

In summary, rational dietary habits and dietary programs can help diabetic patients effectively control blood glucose, reduce the risk of complications and improve the quality of life. Among the "five carriages" of diabetes treatment, i.e., diabetes education, dietary therapy, exercise therapy, medication and glucose monitoring, dietary therapy is one of the most important links in controlling blood glucose and preventing complications. Analyzing and studying the nutritional intervention of diabetic patients has a large research space and research significance, and has positive clinical value. Future studies could focus on the effective components of nutritional intervention and use it as the only intervention without medication.

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