



ROLE OF QUANTITATIVE AND QUALITATIVE DIET IN THE MANAGEMENT OF DIABETES IN MODERN PERSPECTIVE

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ARTICLE INFO

Article History:

Received 4th November, 2017

Received in revised form 8th

December, 2017

Accepted 3rd January, 2018

Published online 28th February, 2018

Key words:

Diabetes, Diet, Life Style.

Metabolic Disorders

ABSTRACT

Diabetes is one of the most life challenging metabolic disorders, found to be bothering at a great scale across the world. Survey shows a scary and rapid growth in the population affected with Diabetes in India. Diet and nutrition are the important factors that can be modifiable for the maintenance of health and prevention of diseases. Metabolic disorders like Diabetes and Obesity can be brought under control with proper diet and exercises up to great extent. Improvement and management of diabetes mellitus (DM) can be achieved by adding more antioxidants, vitamins and minerals. Agreeable food intake, proper regular exercise and right life style enhances absorption, and utilization of nutrients in the body. The diet should be nutritionally balanced well right amount of calorie as per requirement of an individual.

Choosing a low glycaemic index diet should be given priority in selection of balanced diet. Recovery from ill stages of diabetes can be enhanced by being close to the nature, having seasonal and less processed food, low glycaemic index diet. Awareness to take nutritious diet in diabetic condition is utter need of the day. The severity of diabetes becomes worse if the diet is not properly taken and regulated as per need in any metabolic disorders.

Alkali rich food is often recommended in the protein metabolism. Omega 3 fatty acid is of great importance in the skin and bone health and also in the functioning of brain. Those who are having diabetes should avoid taking a more carbohydrate, fat and sodium. Instead, a more amount of fibre, protein vitamins and minerals like zinc, iron, calcium and potassium have to be added for a normal metabolism. The Diabetics should reduce or avoid caffeine, beverages, packaged food, fried items, refined items, processed food, sauces, added sugar, fast food and carbonated drinks as they aggravate the problems.

There are several findings reported about prevention and management of diabetes but quantity and quality of food recommendation is lacking in those. The current motive is in the same direction to look into those aspects in the context of diabetes. An attempt here is done to explore the role of diet in prevention and management of metabolic disorders like diabetes mellitus

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INTRODUCTION

Diabetes is an endocrine disorder, which accompany with creating an imbalance in the metabolism. It is considered as a taxing disorder with a huge economic burden. This disorder affecting a large population throughout the world is one of the major topics of discussion these days (Kurian, Wolfe, & Ikramuddin, n.d.). Poor physical fitness, high lipid profiles, obesity, high blood pressure and related risks are found going hand in hand with Type-2 Diabetes Mellitus (Eriksson & Lindgiirde, 1991). Diabetes has long been regarded as a chronic progressive condition, capable of bringing under control, but not cure.

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A hike in the blood glucose can be found even after treatment or efforts to control the condition. In around seven to ten years of being diabetic in case of type 2, more than 50% of individuals will be in need for insulin administration, as the beta cell function declines with time. Beta cell mass decreases with the progress of Type 2 Diabetes. Hence, to maintain a good control over the glycaemic index, a likelihood of insulin therapy is suggested. (Lim *et al.*, 2011)

Prevalence of Diabetes

Current statistics darkens the disorder indicating the population affected with Diabetes around the world as to reach a 285 million worldwide (Gupta, Joshi, & Dave, 2011) and around 51 million alone in India (Anjana *et al.*, 2011). Studies also shown that the most affected range of age group is 20 to 79 years (Guariguata *et al.*, 2014). In concern to the census,

people are in search for better available remedies to manage this growing endocrine disorder and to get a cure out of it (Khazrai, Defeudis, & Pozzilli, 2014).

Diet modification and its role in Management of Diabetes Mellitus

American Medical Association recommends diet counselling and therapy to minimize the complications of diabetes at the macro or micro vascular level. A diet with all the nutrients should be taken wholeheartedly with the knowledge of its need. The diet counselling helps to improve the knowledge while adapting a new diet as per requirement. (Ajala, English, & Pinkney, 2013)

Glycaemic Index

Carbohydrates are the major source of energy and it is the one related to the rise in blood glucose level after the meal. The glycaemic index (GI) can be used to characterise the capability of carbohydrate-based foods to raise these levels. (Shepherd *et al.*, 2017) Food items that get digested slowly and take long time to get converted into glucose, come under the category of low glycaemic index. These food items are the best for the metabolic disorders like diabetes and high cholesterol. Such products include vegetables and wholesome grains, nuts, legumes etc. Food that are obtained from the nature like fibre rich food and citrus fruits like lemon, and acid like vinegar are known to be with low glycaemic index or slow carb diet. Low GI food help reduce the sugar fluctuations. They give a feeling of fuller for longer time, ease food cravings and provide more sustained energy levels. (Kinnunen *et al.*, 2014) Carbohydrates that break down moderately and release blood sugar moderately into blood stream during digestion are coming under the category of medium GI food. (Frank B. Hu *et al.*, 2001)

On the other hand, carbohydrates that release blood sugar rapidly into the blood stream and break down quickly during digestion, causing vast fluctuations in blood sugar levels, come under the category of high glycaemic index. They can shoot up one's blood sugar level in short time. Those products include refined grains, starchy root vegetables like white potato, winter squash, white rice, sugary food, candy, cookies, cakes, sweet drinks, refined sugar, refined wheat flour, white bread, processed breakfast cereals and other processed items, soda, bottled juices, table sugar, molasses, dried fruits like raisins, dates etc. These items get converted into glucose in a very short period of time. (F B Hu, 2013) These easy carbohydrates will give a tough time to control blood glucose even with diabetes drugs. Starches being cooked for longer duration like pasta, noodles are of high GI. The GI of certain fruits like banana, mango, jackfruit, pineapple, goes high, when it gets over ripened. Therefore, these eatables should be avoided in diabetic condition. (Baker & Friel, 2014) Balance in the glycaemic index in the meal can be attained by combining a high GI food with food of low GI. The factors which influence the GI are age, activity level, digestion capacity, portion size of the carb and reaction time of one's body to carbs. The more the carbohydrates intake, the more the blood sugar get affected. (Li *et al.*, 2017)

Importance of Low GI food

Low GI food may show an immediate effect, if one feels lethargic, losing of concentration or experiencing mood. Low GI diets are important in reducing the risk factors of

developing Type 2 diabetes, heart disease and other degenerative diseases. Low GI food is found to be very effective in maintaining a stable insulin levels, good lipid status, optimum glucose level, and reduce insulin resistance in those who are already diagnosed with Diabetes. These are important aspects to be taken care to avoid alleviating the risk related to long term diabetes and related complications. (Hayes, 2005)

Healthy fats, lean protein, plenty of veggies, and other unprocessed food with low glycaemic load help to feel energetic throughout the day. They also help to make one feel less likely to have cravings towards food which is restricted. Blood sugar swings, moodiness and desire for more carbs can be brought under control in diabetics condition They are the strong indications for people who are under the umbrella of diabetes. This is the time when one should turn back towards the low GI food items.

Insulin plays vital role in the management of diabetes. Carbohydrates get transformed to glucose and get converted into energy for the cells in the presence of Insulin. Thus, insulin has a role of picking up, sending, utilizing and storing of glucose. (Keren Papier *et al.*, 2017) Carbohydrates of all kinds are the main dietary source of glucose. Good choice will be to take sprouted grains, legumes, wild rice or brown or red rice. While the poor choice will be of taking ice cream, soda and carbonated drinks. (Ma *et al.*, 2017)

Foods high on the glycaemic index chart include white bread, white rice, corn flakes, and breakfast cereals. Foods with low GI include fruits, vegetables, legumes, nuts and whole grains. (Novello & McLean, 1968). Low-carbohydrate/high-protein diet, low GI diet (Frank *et al.*, 2001), vegan diet and vegetarian diet are the four type of diets been reviewed for Diabetes. These diets are found to improve the metabolic rates, glycaemic control, increase high density lipoprotein (HDL), and thus ensure cardiac health. But the degree of effect differs according to the pathophysiologic characteristics of each person (Verbrugge & Hesta, 2017).

Antioxidants in the prevention and cure of Diabetes

Antioxidants are one of the major health care ingredients, capable enough to resist and fight against free radicles, oxidative stress and immune related disorders. (Pizzino *et al.*, 2017) The main among them proven to be best for diabetes are the curcumin (found in turmeric), flavonoids (found in dark coloured fruits like pomegranate), polyphenols (found in green tea), Vitamin C (all citrus fruits like lemon, orange, Indian goose berry) and vitamin E (Vegetables like lady's finger, tomato). (Nakazato *et al.*, 2005) Whole grain cereals are being considered as the high sources of dietary fibre. Besides that, the whole grain cereals and the flour made out of it is found to be rich in phytochemicals, trace minerals and phenolic compounds. Research suggests the inclusion of whole cereal flour, or mixtures of different grains to increase the nutritional value of products. (Khor, Wan Ngah, Mohd Yusof, Abdul Karim, & Makpol, 2017)

Curcumin has a long history of usage in Ayurveda medicine treatment for inflammatory conditions (Fonseca-Santos, Dos Santos, Rodero, Gremião, & Chorilli, 2016). It has an ability to inhibit certain nuclear factor which plays very significant role in disorders. It has been used in the treatment of various skin diseases and conditions, especially wounds, psoriasis,

radiation-induced dermatitis, allergic dermatitis and skin cancer. (Abusnina, Keravis, Yougbaré, Bronner, & Lugnier, 2011). Whole cereals are rich in nutrients and phytochemicals. They are also rich in antioxidants, including phenolic compounds, and in minerals. They assist in antioxidants indirectly by way of cofactors such as Iron, Zinc, Copper and Selenium, and directly as antioxidants by way of antioxidant compounds, such as polyphenols, carotenoids and vitamin E (Malireddy *et al.*, 2012)

Health hazards of processed foods and sweetened beverages

Processed foods contain more of refined sugar, salt, saturated and trans-fat that worsens the metabolic condition, leading to diabetes and obesity. Carbonated soft drinks, baked goods, and oils and fats are the most significant vectors for sugar, salt and fat respectively. (Baker & Friel, 2014). Sugar-sweetened beverage (SSB) intake more than once a day contributes to the risk of developing T2DM. (Baker & Friel, 2014)

Insulin resistance, considered to be a major cause for type 2 DM. It can be reversed by increasing the insulin sensitivity, by adding fibre rich diets and by reducing the fat and carbohydrate intake. (Verbrugge, Hesta, Daminet, & Janssens, 2012) Evidence proves that high protein, low carbohydrate, high insoluble fibre diet can help to maintain an optimum body weight and help reduce the daily insulin intake in Type 1 DM (Nelson *et al.*, 2000). Restrictions in the calorie being taken can help reverse type 2 diabetes mellitus rapidly (Perry *et al.*, 2017).

Perspective of Quality and Quantity towards right Nutrients

Diets with the right amount of nutrients and calories can stabilize blood glucose level to normal and help to attain an optimum lipid profile and body weight. (Heshka & Jones, 2001, Meister, 2000). The Daily requirement of the nutrients for a Diabetic depends on Body Mass Index. Still, a general view can be estimated as 55-60% of carbohydrates, with a high fibre and of a low GI. To get the meal balance 10% of sucrose and a moderate quantity of fructose of less ripe fruits may be included. The second major nutrient known as protein can be of 10-15% of daily calorie intake, said as 1g/kg body weight for an individual and the Diabetics with nephropathy will be advised to reduce the daily limit to less than 0.7 g/kg of body weight and below 0.6g/kg intake of protein, a day is a factor leading to malnourishment. The third main nutrient is fats, and a recommended intake of unsaturated fat is less than or equal to 30%, and saturated fat of less than 8-10%. (Miggiano & Gagliardi, 2015)

For those who have found with a high Low-density lipoprotein and high triglycerides, unsaturated fat intake for more than 5% must be of high concern. Vitamins and minerals are the micronutrients, needed in less quantity but, are of great importance in vitalizing the body functions. Multivitamin supplements are suggested for patients with Diabetes for a better insulin secretion and absorption of nutrients. (Miggiano & Gagliardi, 2015). The consumption of food items with trans-fat, formed during the partial hydrogenation of vegetable oil and high glycaemic load reflects with an inverse effect on the blood glucose level.

In short, adapting on with a diet rich in fibre and polyunsaturated fat is assumed to reduce the risk for diabetes and heart-related disorders. (Frank B. Hu *et al.*, 2001)

CONCLUSION

Low glycaemic index diet is the best for diabetics, as it delays the glucose from reaching into the blood stream. A good nutrition plan should always go with a considerable amount of physical activity and energy expenditure. A low glycaemic index food based lifestyle will provide benefits to not only Diabetics, but also for other disorders like obesity and hypothyroidism. Food is a fuel for our body. Eat well and our body will reward us. To get started, take an effort to avoid high glycaemic index food and generate interest in medium and even better if the glycaemic index is low, for a safe progress with health.

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How to cite this article:

Jintu Kurian and Guru Deo (2018) 'Role of Quantitative and Qualitative Diet in the Management of Diabetes in Modern Perspective', *International Journal of Current Advanced Research*, 07(2), pp. 10114-10117.
DOI: <http://dx.doi.org/10.24327/ijcar.2018.10117.1700>
