

REVIEW ARTICLE

Ayurvedic dietary principles in prevention and management of Diabetes: A review

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Abstract

Diabetes mellitus, especially Type-2 is one of the major non-communicable diseases with growing prevalence at the global level. Major contributory factors for diabetes are genetic predisposition, environmental factors, lifestyle and unhealthy diet. Poorly controlled diabetes can lead to a number of complications and food can be a powerful tool in preventing or reversing diabetes. Modern dietetics adopt a reductionist view in determining the diet protocol with emphasis on the macro as well as micronutrients in the food and overlooks the varied demands of the person consuming it. This is where India's traditional medical system, Ayurveda can contribute with its holistic approach. Ayurveda advocates diet that is tailored to meet the needs of the individual. The dietary guidelines incorporate multiple factors comprising the prakriti (body composition), dosha (body humors), agni (digestive power), desa (place of living), kāla (age and season) and sathmya (homogeneity) of the individual. Following such a diet pattern in the long run will aid in preventing metabolic diseases, especially diabetes. In case of manifested diabetes, the management protocol is formulated based on the above said factors and consequently the diet also should be personalized. Differences in the metabolic demands among patients who are obese and non-obese warrants separate dietary guidelines for both groups. Hence a relook into the basics of ayurvedic dietetics and therapeutic approaches could enable researchers and practitioners to have fresh insights in the prevention and management of diabetes mellitus.



Open Access

Citation: Edavalath, M. Ayurvedic dietary principles in prevention and management of Diabetes: A review. *Endocrinology, Diabetes and Obesity*. 2018; 1(1):2.

Received: Dec 21, 2017

Accepted: May 07, 2018

Published: May 21, 2018

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Keywords

Diabetes mellitus; prameha; ayurvedic dietetics; prakriti; ahara; agni; medicated diet

Introduction

Diabetes mellitus, especially Type-2 is one of the major non-communicable diseases with its prevalence increasing at the global level.¹ Type-2 diabetes results either due to peripheral resistance to insulin or reduced production of insulin from pancreas. Poorly controlled diabetes can lead to a number of complications, including heart diseases, stroke, kidney disease, blindness, neuropathies, leg and foot amputations or even death.¹ Major contributory factors for diabetes are genetic predisposition, environmental factors, lifestyle and unhealthy diet, in turn fueled by rapid urbanization and economic growth.³ Food can be a powerful tool in preventing or reversing diabetes.¹ The onset of Type-2 diabetes usually ensues in middle age, but then minor changes in diet and lifestyle can greatly reduce the chances of getting the disease. Greater adherence to the diet combined with light physical activity was associated with lower odds of having diabetes after adjustment for various factors.¹

Similarly, in the management of diabetes, a diet tailored to the needs of the individual is vital in bringing better glycemic control and preventing complications. The traditional approach to diabetes focuses on limiting refined sugars and foods with high glycemic index.² With

carbohydrates restricted, the diet may comprise an unhealthy amount of other nutrients like fat and protein. Likewise, attempts to adhere to the conventional food measurements of 'diabetic diet' usually result in excessive restrictions, overindulgence, or monotonous intake of certain food items. Few of the recent studies also showed that too much diet restriction could cause more harm than good in diabetes.⁴ Further, the modern dietetics adopt a reductionist view in defining the diet protocol, with emphasis on the macro as well as micronutrients in the food and overlooks the varied demands of the person consuming it. This is where India's traditional medical system, Ayurveda can contribute with its holistic approach to health and disease. Its dietary guidelines incorporate foods that are indicated and contraindicated for an individual, the timings and method of food intake including mindful eating. It further lays stress on customizing the diet for each individual based on the prakriti (body composition), the dosha (body humors) and the agni (digestive power).⁵ Necessary adjustments are also advised based on the desa (place of living), k  la (age and season) and sathmya (homogeneity) of the person. A dietary regimen formulated based on these principles is considered beneficial for a healthy metabolic state thus preventing disorders like diabetes. In the management of diabetes, the ayurvedic approach differs in patients who are obese and non-obese, consequently the diet also varies between them.⁶ A fore mentioned factors like prakriti are also taken into consideration while planning the diet strategy in patients. With recent trials on dietary regimens giving promising outcomes, a relook into the basics of ayurvedic dietetics and therapeutic approaches could enable researchers and practitioners to have fresh insights in the prevention and management of diabetes mellitus.

Basic principles of Ayurveda

It is imperative to get a general overview of basic concepts of Ayurveda to understand its dietary principles and their practical application. Ayurveda, the term meaning "the knowledge of life" or "the science of life", despite being a medical system, is also a way of life, which instructs how to lead a normal healthy life in all aspects. Ayurveda approaches health in two perspectives, first the preventive aspect where the aim is sustaining health in healthy and the second one the curative aspect which aims at treatment of the manifested diseases. In both these facets, diet has been given prime importance as Ayurveda envisages that body is made up of what one eats and so are the diseases.

Tridosha concept

As per Ayurveda, any substance in the universe, living or nonliving, are made up of five basic elements called the Panchamahabhoota, which are Prithwi (Earth) Apa (water), Teja(Fire), Vayu(Air) and Akasha (Ether), in their varying permutations and combinations. The Human body consists of three basic functional units or Tridosha (three biological humors) which are Vata, Pitta & Kapha, seven structural units or Sapthadhatu and three waste products or Trimala.⁷ All these have amalgamations of the panchamahabhoota in different ratio and the effect of diet on these basic units of the body are explained based on the panchamahabhoota composition of the food ingested.⁸ In short, ayurvedic dietetics is concerned primarily with the energetics of food as a means of balancing the tridosha where each food article either has an aggravating, pacifying or balancing action on the tridosha. For this purpose, food substances are primarily classified according to their rasa (taste) and guna (attributes), based on which their pharmacological properties and actions are elaborated. Rasa is said to be the total sensory experience involving the nose, tongue, and throat, based on which six types have been defined, namely madhura (Sweet), amla (Sour), lavana (Salty), katu (pungent), tikta (bitter), and kasaya (Astringent).⁹ A well-balanced Ayurvedic diet would always comprise the six tastes, which in turn plays a role in homeostasis. Excessive intake of one or the other rasa can tilt the equilibrium leading to a health problem. As an example, excessive intake of sweet foods can lead to obesity and pungent foods to acidity. Guna is the quality or attribute of a substance which is decided by its physical characteristics or the change that it brings about in the body.¹⁰ There are twenty types of guna, examples being guru (heavy), snigdha (unctuous), ushna (hot) etc.

Prakriti – a guide to personalization

Each individual is unique in his/her health and ill health and require personalized care depending on their distinctive Prakriti (body constitution).¹¹ Prakriti is a set of physical, physiological and psychological attributes that are unique to an individual and can be considered as a phenotypic phenomenon arising from a particular genotype.¹² Human beings are classified into seven Prakriti types, the categorization being done based on certain

attributes of the tridosha in their body. Recent studies have validated the genetic basis of this classification, with each constitutional type exhibiting noticeable differences in regard to biochemical and hematological parameters and at genome wide expression levels.¹³

Agni – the digestive power

Apart from the tridosha, another important factor considered to be of vital importance in maintaining health is Agni or the digestive power.¹⁴ Agni can be deciphered as the energy that drives metabolic processes, at various levels in the body including the gut, tissue and the elemental level. Normal functioning of agni ensure healthy living, which in turn is facilitated by a suitable dietary regimen.

Ayurvedic understanding of diabetes

Classical Ayurvedic textbooks have references of a disease named madhumeha confirming to diabetes mellitus, under the concept of Prameha.¹⁵ Prameha is a disease characterized by increased quantity and turbidity of urine. Various etiological factors have been elaborated, which includes prolonged consumption of sugar and its derivatives, freshly harvested cereals, meat of marshy animals etc. to name a few, as well as sedentary lifestyle, all of which are relevant even in the present era. Over nutrition as well as irregular diet pattern results in dysfunction of agni, facilitating formation of ama (partially digested/toxic substances), which in turn is deemed as the root cause of various metabolic diseases including prameha.¹⁶ This concept of aberration in the digestive process has been recently corroborated through evidences gathered from studies on the role of gut dysfunction in pathogenesis of diabetes. The general rules of dietetics advocated by Ayurveda has an important role to play in maintaining normalcy of agni, thus preventing progression into metabolic diseases.

Basics of ayurvedic dietetics

Ahara (food)

“Food” denoted by the term Ahara,¹⁷ is one among the three pillars that support life, the other two being nidra (sleep) and brahmacharya (measured celibacy). In contrast to the conventional Western approach, Ayurveda places greater emphasis on the quality, quantity, processing, compatibility and rules of consumption. The terms pathya (compatible) and apathya (incompatible) are used to denote the acceptability and adoptability of a particular food in a given context.¹⁸ Adhering to these rules in daily life will enable in preventing dysfunction of the agni, thereby evading formation of ama and maintain tridosha homeostasis. Ayurvedic dietetics can be construed under three categories viz. Selection of food (What to eat), Timing of food (When to eat) and Rules of consumption (How to eat).¹⁷

Selection of food

Customization of diet is carried out based on many factors, among which important ones are Prakriti, Guna (Attributes), Samskara (Processing), Sathmya (homogeneity), Vaya (Age), Desa (Habitat) and Kala (Seasons).¹⁹

Selection of food based on prakriti

As stated earlier, recommendations on diet, lifestyle and drugs vary based on one's prakriti. Individuals of Kapha predominant prakriti are slow metabolizers, they can tolerate hunger and thirst, require small amounts of food and takes more time to digest. They may show weight gain even with small quantity of meals and their propensity for obesity is high. Hence, they are advised to undergo periodic fasting, consume small meals, especially with pungent, bitter, and astringent tastes. They may also be asked to include spices in their food and consume hot beverages.

Pitha prakriti individuals are fast metabolizers, can digest heavy food and require large quantities in frequent intervals. They cannot tolerate hunger or thirst and are prone to acid peptic diseases. They may be instructed to have food and beverages preferably with cooling properties, more of Sweet and astringent tastes and should control acidity. They have to avoid excess of spices and foods with pungent, salty, and sour taste.

The individuals of vatha predominant prakriti have variable metabolic pattern, eat fast and consume small amounts. They will not gain much weight even with prolonged nourishing therapies and are more prone to degenerative diseases. They are advised to consume food items with higher fat content like clarified butter, edible oils, meat etc. and hot food and beverages. Food with sweet, salty and sour taste are preferable, with restricted pungent, spicy

and astringent ones.

Prakriti is one among several other factors that predisposes the individual for certain diseases and in the case of diabetes, people with kapha predominant prakriti are more prone to develop the disease.²⁰ Hence modifying the diet in a kapha predominant prakriti could prevent or delay the onset of diabetes.

Selection of food based on guna and rasa

The selection of food items based on their guna (attributes) takes into account, the prakriti, vikriti (diseased state), seasonal variations and agni. Food items have been classified based on their inherent attributes, one example being guru (heavy to digest) and laghu (light to digest). For instance, black gram is heavy and difficult to digest whereas green lentil is light and easy to digest. In case of earlier description about prakriti, application of this guna concept is important in determining the food items for each prakriti, for e.g. in an individual with kapha type of prakriti, since kapha is guru (heavy) and snigdha (unctuous), diet with similar qualities might aggravate kapha, leading to diseases of its imbalance. Hence the food should possess qualities that counter balance kapha to maintain the dosha equilibrium. Similar is the case in vikriti (diseased state) where administering food with opposite qualities of the aggravated dosha will enable in pacifying the disease. Moreover, it is imperative to assess the agni or digestive power, where individual with poor digestive power will not be able to digest properly foods which are guru (heavy), snigdha (unctuous) and sheetha (cold) whereas these digests well in a person with good agni. Along with guna, the concept of rasa (taste) is also a key factor in selecting the diet because each rasa has its effect on the tridosha and agni of the individual. For example, Madhura (sweet), amla (sour) and lavana (salty) aggravates kapha but pacifies vatha. In prevention of diabetes, the general advice is to avoid excess intake of guru, snigdha, madhura and amla predominant foods.

Selection of food based on samskara

Samskara or processing of dietary items in order to bring changes in the attributes for better palatability or preservation is also another important factor to be considered while choosing the food. The same food stuff can be processed differently and they attain different guna depending upon the method of processing. For example, puffed rice is lighter to digest compared to flaked rice. Similarly, processing can have beneficial effects as in the case of milk boiled with dry ginger in asthma patients or have detrimental effects like deep frying in oils leading to atherogenesis.²¹ Regular consumption of food treated with fat, sugar confectionaries, dairy products and processed meat, are better avoided to prevent the manifestation of diabetes.

Concept of virudha

Another important concept in ayurvedic dietetics is Virudha or incompatibility.²² Certain food items are deemed unfit to consume when consumed in combination. An example is the case of fruits with milk, which is contraindicated. This concept is recently validated by a study conducted on milk and blue berries where it is demonstrated that, when used together, it leads to reduction in the antioxidant properties of blueberries.²³ Like this, eighteen types of virudha have been mentioned, when consumed for a prolonged time leads to various metabolic as well as other systemic diseases. Combination of food items can have beneficial effect also as in the case of curd when taken with green lentils. In near future, the emerging field of trophology could throw light into the harmful / beneficial effects of such combinations, as elaborated in classical ayurvedic textbooks.

Selection of food based on age

Age of the individual is significant in deciding the diet because of the varying metabolic demands in different age groups and also the dosha predominance in each age group. Kapha dosha is predominant in childhood, pitha in the middle age and vatha in the old age.²⁴ Accordingly the diet should be tailored in each age group in such a way that the respective dosha are not vitiated, thus preventing diseases. Following a diet that does not derange kapha in the childhood could delay the onset of diabetes especially in predisposed individuals.

Selection of food based on desa

Desa or habitat where the food is produced and consumed is also important, as Ayurveda advocates intake of food cultivated in respective habitats to be more congenial for individuals. Seasonal variations are also to be considered, in order to modify the diet to counterbalance

the fluctuations of tridosha in different climates. Variation in chemical constituents of the food, metabolic demands of the body as well as physical activity further warrants alteration in diet according to changing seasons.

Quantity of food

Right quantity of food depends on many factors like personal requirement, type of food and the agni (Digestive capacity) status of the individual. As far as the type of food is concerned, food items that are deemed difficult to digest should be taken in half of the quantity that cause satiety and easily digestible ones in a quantity which does not cause over satiety. Ayurveda also instructs a three portions technique in which the stomach capacity is divided into three parts of which one part should be filled with solid food, one part with liquid and the third part left vacant.²⁵ This enables proper functioning of the digestive apparatus, preventing formation of ama.

Timing considerations

Time of food intake is to be fixed based on the individual needs of the person and can vary between individuals. Generally, Ayurveda advises to take food only twice a day, preferably one in the morning and one in the evening.²⁶ Two important factors to be considered for fixing the time of the food intake are the signs of proper digestion of previously ingested food and attainment of good hunger. In the current scenario, even though it is not feasible to advice food intake twice a day, the determinant factors in terms of attaining hunger and signs of digestion of the previous food should always be emphasized. Proper digestion of previous food is indicated by feeling hunger and thirst, eructation which does not have the taste of previous food, feeling lightness of abdomen and body, and proper evacuation of feces and urine. Intake of food before complete digestion of the previous food is called as *adhyasana*²⁷ and leads to formation of ama, culminating in diseases.

Other rules of consumption

Apart from timing of food intake, speed of food intake is also of prime importance, where slow eating promotes better digestion, greater satisfaction and better weight loss or maintenance.²⁸ Mindfulness during eating promotes optimal digestion and is considered to improve glycemic control.²⁹ Overpowering emotions during food consumption and digestion can lead to irregular and anomalous digestive process.

Diet in management of diabetes

Following a proper diet is as important as medications in managing diseases, especially those that run a chronic course like diabetes mellitus. The current medical nutritional therapy aims to achieve and maintain body weight goals, attain individualized glycemic, blood pressure, and lipid goals and delay or prevent or treat the complications of diabetes. This is intended to be delivered by a registered nutritional therapist and adherence to this therapy is associated with A1C decreases of 0.3–1% in type 1 diabetes and 0.5–2% patients with type 2 diabetes.³⁰ The strategies used include carbohydrate count and exchange list, which are too complicated for a common man to comprehend and adhere to. Further, numeracy literacy concerns on the part of patients can result in poor compliance to a well calculated diet. Moreover, this dietary regimen does not take into consideration many factors explained earlier in ayurvedic dietetics including prakriti, seasons or status of the agni. Ayurvedic approach in management of diabetes patients is unique in that, it takes into consideration the prakriti, agni, dosha state as well as co- existent manifestations of diabetes, while customizing the diet. It further recommends having a consistent amount of food, at a fixed time every day and to adopt necessary alterations based on seasonal variations. Further, Ayurveda classifies diabetic patients into obese and lean types before initiating therapy as the strategies are different in both of these. In obese individuals, the diet is tailored to bring about depletion in body tissues and is facilitated by prescribing food items which are difficult to digest and having less nutritive value. In the lean type, food which are easy to digest and having nourishing property are used.³¹

Table 1.Examples of generally recommended food items in diabetes mellitus

Nutrient	Sources
Carbohydrate	<ul style="list-style-type: none"> Whole grains - <ul style="list-style-type: none"> One year old rice Buckwheat, Barley, Wheat, Pearl millet, Wild rice, Maize Unripen banana flour
Protein sources	<ul style="list-style-type: none"> Beans such as moth beans, mung beans, lima beans, soy beans Green gram, fenugreek Grilled meat
Fat sources	<ul style="list-style-type: none"> Clarified butter Butter milk Mustard oil
Vitamin and other micronutrients	<ul style="list-style-type: none"> Vegetables like bitter gourd etc with astringent and bitter taste Leafy vegetables

Ayurveda does not advice absolute restriction of any of the food substances, rather recommendations are based on the dosha state. For example, in diabetic patients with vatha predominant manifestations, extensive use of various oils has been mentioned.

Another area where modern dietetics contradict ayurvedic principles is advice of frequent small servings. Frequent intake of food hampers the digestive process and is validated by a recent randomized crossover study, in which it is found that eating two larger meals a day (breakfast and lunch) is more effective than six smaller meals in a reduced-energy regimen for patients with type 2 diabetes.³²

Medicated diets

Ayurveda makes use of medicated diet, where dietary items are processed with medicinal herbs to bring about therapeutic effects in the body. One example is dashamoola yavagu which contains rice gruel processed with roots of ten medicinal plants.³³ This is being currently investigated for its efficacy in bringing glycemic control as well as preventing complications of diabetes.

Conclusion

Ayurvedic concepts and practices on health, food, and nutrition are relatively different from those of biomedicine and modern nutrition. Systematic investigation can provide new insights into nutritional sciences to provide solutions in contemporary healthcare, for instance, how diet and life-style can be modulated to suit one's prakriti, age, and season. Moreover, prevention and management of lifestyle diseases like diabetes can only be achieved by tailoring the measures to meet the individual demands rather than adopting a generalized strategy.

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