



Review Article

A REVIEW ON RASAYANA WITH SPECIAL REFERENCE TO NUTRACEUTICALS IN THE MANAGEMENT OF DIABETES MELLITUS

Sikha Lekharu^{1*}, Khagen Basumatary²

¹Post Graduate Scholar, ²Prof and HOD, PG Dept. of Samhita and Siddhanta, Govt. Ayurvedic College, Guwahati, India.

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ABSTRACT

Treatment of diabetes is challenging not because of available, safe and effective method; rather, unawareness and denial of this disease add to the treatment challenge. The good news is the incidence of people who were previously unaware or denying they have diabetes has decreased from 30 to 25% over a two-year period. This suggests that efforts to increase awareness are working and people are better prepared to manage the disease and its complications. DM is a chronic condition that results from an inadequate ability or failure to metabolize carbohydrates, fats, and proteins. Because people are so much in diabetes that they are searching for the treatment or rather managing the disease, and for that the concept of nutraceuticals is coming out in the world and wide acceptance is gathered. Indian gooseberry, *Jambal* fruits, Bengal gram, black gram, mango leaves, string beans, cucumbers, celery, and onions are vegetables and fruits found useful in the treatment of diabetes [Diet Health Club 2008] This concept has been in the Ayurvedic classics since time immemorial and can be understood by the topic *Rasayana*. In this article how *Rasayana* can be helpful in *Prameha* is been studied with the help of recent research in the field of modern medicine.

*Address for correspondence

Dr. Sikha Lekharu

Post Graduate Scholar,

Department of Samhita and

Siddhanta, Govt. Ayurvedic

College, Guwahati,

Email: shikhalekharu@gmail.com

Ph no: 8811834122

INTRODUCTION

Diabetes mellitus (DM), the all American disease, is currently the seventh major cause of death in the United States, with a staggering healthcare cost of 174 billion dollars annually (Beechar 1999; Houston and Egan 2005; Lovelady 2005; American diabetes 2008)³. Press releases issued by the centers for disease control and prevention in June 2007 and 2008 stated that the number of people with DM increased to 24 million. This is an increase of more than 3 million in a two year time interval. According to these data, 8% of our population is afflicted with this disease and 25% are 60 years of age and older. Concurrently, 57 million are estimated to have prediabetes, placing them at a higher risk for DM Globally, an estimated 422 million adults are living with DM, according to the latest 2016 data from the world health organization (WHO)⁶. Diabetes incidence is increasing rapidly. Type 2 diabetes makes up about 85-90% of all cases. Increase in the overall Diabetes prevalence rates largely reflect an increase in risk factors for type 2, notably greater longevity and being overweight or obese. The increase in the incidence in developing countries follows the trend of urbanization and lifestyle changes including increasing sedentary lifestyle, less physical demanding work and the global nutrition transition marked by increased intake of food that are high energy dense but nutrient poor (often high in sugar and saturated fats, sometimes referred to as the western pattern diet). The risk of getting type 2 diabetes

have been widely found to be associated with lower socioeconomic position across countries.

Until recently India had more diabetes than any other country in the world, accordingly to the international diabetes foundation, although the country has now been surpassed in the top spot by china. Diabetes currently affects more than 62% million Indians, which is more than 71% the adult population. The average age on onset is 42.5 years. Nearly 1 million Indians die due to diabetes every year. According to the Indian heart association, India is projected to be the home to 109 million individuals by 2035. A study by the American diabetes association reports that India will see the greatest incidence of in people diagnosed by 2030. The high incidence is attributed to a combination of genetic susceptibility plus adoption of a high calorie, low activity lifestyle by Indians growing middle class.

MATERIALS AND METHOD

Ayurvedic textual material were referred mainly with available commentaries of the samhitas for the study. Some modern books of nutraceuticals, medicine, pharmacology, e journals etc have also been done. From these books references have been collected and studied systemically.

AIMS AND OBJECTIVES

- 1) Understanding the concept of *Rasayana* in Diabetes Mellitus.
- 2) Understanding the concept of nutraceuticals.

- 3) Analysis of the recent nutraceuticals useful in diabetes mellitus.

DISCUSSION

In Ayurveda it is said that the physical body is the product of diet and sensory inputs (i.e. lifestyle). Similarly all ailments are the products of faulty dietetics and lifestyle on one's health. Wholesome and unwholesome diet are the fundamental of health and disease. The comprehensive/integrative spirit physiological system functions), *Dhatus* (tissues and organs) and *Mala* (metabolic by-products) along with sensorial, mental and spiritual well being. According to the Ayurvedic model, lifestyle and nutrition in a given environmental context is the glue that holds equilibrium to bring about optimum health. This ancient understanding is being reintroduced as Nutraceuticals by present day health care providers.

NUTRACEUTICALS^{6,13}

The word "Nutraceutical" coined by Dr Stephen de felice (2007) who defined it as a substance that is a food or a part of food and provides medical and health benefits including prevention and treatment of disease. Such products may range from isolated nutrients, dietary supplements and specific diets to genetically engineered foods, herbal products and processed foods such as cereals, soups, vegetable juices etc. It is important that this definition applies to all categories of food and part of food including folic acid, antioxidant food substances, stimulant functional food and pharma food. Another definition as suggested by Dr. Lockwood, stating that "Nutraceutical is the term used to describe a medicinal or nutritional component that includes a food, plant or naturally occurring material which may have been purified or concentrated and that is used in the improvement of health, by preventing or treating a disease. The mode of action of Nutraceutical is not specific. They are broadly classified into five categories namely:

- 1) Vitamins
- 2) Minerals
- 3) Botanical substances
- 4) Herbal extracts
- 5) Miscellaneous or speciality components (krull & swartz 2001).

Vitamins fat soluble water soluble nutritional factors Minerals mineral chelates salts single and trace elements multiple minerals including amino acid mixes Botanical substance: mixed and single whole herbs, traditional formulas Speciality components –anti-oxidants, carotenoids, essential (omega 3 & omega 6), phtosterols, anthocyanins, flavonoids, probiotics etc.¹³

Rasayana^{4,11}

This concept of promoting health and preventing disease through nutrition and special nutritional preparation has been used for millennia in Ayurveda. The concept is known as *Rasayana*, being one of the eight clinical specialities of Ayurveda. The Sanskrit roots of *Rasayana* essentially refer to acquisition, movement or circulation of nutrition needed to provide nourishment

to the organs, tissues and tissue perfusion (*Astanga Hridaya* 300 AD, chapter 29; *Sharangadhar samhita* 1300 AD, Singh 2003, 2007; Narsimhamurthy et al 2006; Singh, Narasimhamurthy and Singh 2008). The concept of promotion of health through *Rasayana* is based on Ayurvedic pathophysiology and its understanding of health and physiological system imbalances that lead to disease development. The philosophy of the Ayurvedic integrative spirit mind body environment model holds that the optimum health of an individual can be achieved only when all the human dimensions are integrated. That means that healthfulness is an outcome of a dynamic interaction among our genetic (physiological), mental (pshychological), emotional, spiritual, social and environmental factors. In other words, the basis of science of *Rasayana* is much more comprehensive than the emerging field of nutraceuticals.

How *Rasayana* is useful in treating diabetes mellitus^{4,11}

"*Rasayanatantranam nama Vayasthapanamayurmedhabala-*

***Karamrogapahanasamarthan ca*"(Su. Sa 1:7)¹¹**

Rasayana tantra deals with the methods to maintain youthfulness, to increase longevity, intellectual capacity and physical strength as well as to enable the person to be free from diseases. Going through the pathogenesis of *Prameha* and the benefits of *Rasayana*:

- 1) In *Prameha*, *ojha* is considered to be one of the *Dushya* which is hampered. This *Ojha* is the *Apara ojha*, as considered by *Chakrapani*. apart from this the *Dosha* i.e., *Vata pitta* and *Kapha* involved which is due to the faulty diet and regimen which are followed which ultimately hampers the *Agni* and subsequently proper functioning of the *Dhatus* doesn't take place, particularly *Meda*, *Rakta*, *Ambu*, *Vasa*, *Asika*, *Majja*, *Rasa* and *Mamsa*. Barring the *Jataja pramehi*, *Prameha* developed due to faulty diet and regimen can be corrected. *Rasayana* are intended to convert directly to *Rasa*, bypassing ordinary digestive steps. In so doing, they do not produce *Ama* and start the unfolding of *Dhatus* in the best possible manner so that as much *Ojas* as possible can emerge. If *Rasa* is the base of the Ayurvedic nutrition pyramid, *Ojas* could be the pinnacle. *Rasayana* ensure a royal path from *rasa* to *Ojas*.
- 2) *Rasayana* drugs produce their effect in the spirit mind body system through one or combination of the following three modes.

At the level of Drugs useful in *Prameha*

<i>Rasa</i>	:	<i>Kashaya yukta dravya sneha</i>
<i>Agni</i>	:	<i>Sunthi Chitraka</i>
<i>Srotas</i>	:	<i>Shilajatu Guggulu</i>

- 3) It is seen that Diabetes mellitus induced complications are very common. So if *Rasayana* can be used in the form of *Naisargik* or *Ajasrik*. *Ajasrik* as daily consumption by DM patients as for example *Triphala*, *Haridra*, *Amlakhi* etc. In the *Naisargik* form,

in DM associated cardiovascular diseases *Arjun-kshirapaka*, garlic, in DM induced atherosclerosis *Lasuna*, *Curcumin* can be used. It is seen that dm and obesity are interdependable. In such situation, soy proteins rich in phytoestrogens. In retinopathy induced by DM vitamin C rich supplements should be consumed. And in DM neuropathy *Guduchi* is indicated.

Analysis of the Recent Work Done Worldwide as Helpful in DM ^{6,13}

1) Nutraceuticals vitamins, minerals and enzymes

- a) Biotin increases glucokinase activity, thereby improving glucose tolerance and insulin sensitivity.⁶
- b) Chromium is an essential micronutrient acting as a cofactor in numerous insulin regulatory steps. It reduces fasting sugar, postprandial glucose, hemoglobin A1C, insulin resistance etc.
- c) Copper increases insulin sensitivity and improves glucose levels. However excessive intake of copper may induce or produce insulin resistance.
- d) Flavonoids enhance insulin secretion, improve insulin sensitivity, reduce serum glucose and inhibit sorbitol accumulation in the lens of the eyes and nerves.
- e) Folate and vit 12 (cyanocobalamin) have no significant effects on glucose metabolism, however both are noted to improve symptoms of diabetic peripheral neuropathy.
- f) Glutathione is the most potent intracellular antioxidant decreasing the levels of glutathione results in insulin resistance, glucose intolerance and increasing oxidative stress.
- g) Inositol or myoinositol is required for normal nerve function. Consumption increases diabetic neuropathy.
- h) Magnesium improves insulin secretion and sensitivity.
- i) Mono-unsaturated fats improve glycemic control.
- j) Omega 3 fatty acids improve insulin sensitivity and insulin secretion and reduce serum glucose.
- k) Vit B6 serves as a co enzyme in carbohydrate metabolism. It prevents diabetic neuropathy, improves symptoms and inhibits glycosylation.
- l) Vit C (ascorbic a) reduces glycosylation of proteins and reduces sorbitol accumulation.
- m) Vit E derivative has shown to improve insulin action, reduce resistance, improve glucose control and reduce glycosylation of proteins.

2) Rasayanas

As Antioxidant

Amlakhi

There is very limited human evidence on *Amla* at this moment in time, but it appears to be very promising as it could lower blood glucose in both healthy persons and diabetics with a potency similar to the reference drug glibenclamide. In animal research, *Amla* appears to

be able to reduce triglycerides and better the cholesterol profile as well as benefit cardiovascular health (the heart and vessels themselves). Most of these actions are attributed to its antioxidant properties, which are partially derived from a high Vitamin C content but also from a large amount of tannin compounds that are also found in other potent antioxidants like *Camellia sinsensis* (the plant that bears Green Tea Catechins) and *Dimocarpus longan*.

Bahera

Ramesh kumar et al (2011) postulated that the crude aqueous extract of the fruits of *Terminalia belerica* Roxb have antioxidant properties since these contains enzymatic and non-enzymatic antioxidants these can be very effective against microbes causing various diseases. In vitro assessment of the antioxidant activity of ethanolic fractions of the of the plants to scavenge 2,2-diphenyl -1-1-picrylhydrazyl (DPPH) and highly reactive hydroxyl radicals showed that the semi pure compounds present in the fractions are useful potential source of antioxidants and can be used in the therapy of diseases like cancer, coronary heart disease, ageing and any other disease related to oxidative stress. These fractions being non-toxic showed significant antioxidant activity at scavenging free radicals. They also significantly scavenge hydroxyl radical which is known to cause cellular damage.

Haritaki

Terminalia chebula exhibited anti - lipid peroxidation, antiperioxide radical formation and free radical scavenging activities. In vitro evaluation of *T. chebula* shows that tri-ethyl chebulate is a strong antioxidant and free - radical scavenger, which might contribute to the antioxidative ability. The aqueous of *T.chebula* seems to be able to protect cell organelles from radiotherapy induced damages.

SOME OTHER HERBS⁹

1) Momordica

Steroid saponin - charantin, momordicin, ascorbic acid repairs the damaged beta cells, increased insulin levels, enhance the sensitivity of insulin, inhibits the absorption of glucose of glucose by inhibiting glucosidase.

2) Fenugreek

4-hydroxyisoleucine, may help to stimulate the secretion of insulin, reduce insulin resistance and decrease blood sugar levels.

3) Andrographis

Reduce hepatic antioxidant enzymes, depletion of hepatic glutathione and increased activities of hepatic gamma glutamyl transpeptidase and lipid peroxidation

4) Green tea

Reduces fasting and postprandial glucose, fructosamine and HbA1c and improve insulin resistance.

- 5) Turmeric:** Direct antioxidant and free radical scavenging mechanism as well as the ability to directly augment glutathione levels.
- 6) Cinnamon:** ⁸ The most common spice. it activates the glycogen synthase in glucose uptake, the inhibition of glycogen synthase, its antioxidants.

CONCLUSION

Although drug therapy may be required for the treatment of diabetes and metabolic syndrome, appropriate lifestyle changes with healthy diet and nutraceutical supplements are the cornerstone for the clinical management and prevention of both countries. On a fundamental level, Rasayanatantra is based on the Ayurvedic cosmology, which proposes that consciousness is the basis of matter, energy, chemico-physical, bio-physical. This means that every thought becomes a molecule and that over food, sensory inputs are interconnected and govern our gene expressions and thus healthfulness. Because our genes have not changed thousands of years, our food and way of living in a given environmental context plays a crucial role in the promotion of health and disease prevention. The treatment and management of DM in the past 50 years have changed from a disease known to produce early disability and demise to one that is complicated to manage but with an excellent prognosis. Thus, the continued use of nutraceutical look bright as a supplement in addition to conventional medically proven drugs in the control and management of this chronic disease, Diabetes Mellitus. The country's imminent dilemma of increasing healthcare costs is a threat to our continued efforts to progress and improve outcomes in the management of these conditions. Dissatisfied consumers met with exorbitant drug costs, lack of improvement in conventional therapies, poor therapeutic alternatives for chronic diseases such as diabetes, inadequate rapport between medical providers and patients in managed care, desired personalized medicines, an enlarging population trying to prevent the effects of aging, and new insights into the concept of preventive medicine have initiated the emergence of the use of nutraceuticals as an alternative venue to promote wellness and the prevention of ailments. Data show that more than 40% of Americans are using alternative medical therapies, nutraceuticals, herbals, and botanicals [DeFelice 2008]⁶. The surmounting concern in reference to the historical use of nutraceuticals by itself is not enough to ensure safety even if historical use is characterized by consumption or by use in folk medicine

all over the world [Degan et al 2005]⁵. Despite these stumbling blocks, the future and continued use of nutraceuticals look bright as a supplement in addition to conventional medically proven drugs in the control and management of this chronic disease, DM.

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