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Review Article

Global prevention and control of type 2 Diabetes Mellitus through Ayurveda w.s.r. to Spices

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ABSTRACT:

Diabetes mellitus (DM) remains a major health care problem worldwide both in developing and developed countries. Many factors, including age, obesity, sex, and diet, are involved in the etiology of DM. Nowadays, drug and dietetic therapies are the two major approaches used for prevention and control of DM. Compared to drug therapy, a resurgence of interest in using diet to manage and treat DM has emerged in recent years. Conventional dietary methods to treat DM include the use of spices. Spices have long been known for their antioxidant, anti –inflammatory, and anti-diabetic properties and also add flavour to food, also easily available in global market, so I choose this topic to study and explores the anti-diabetic properties of commonly used spices, such as Cinnamon, Cumin seed, Garlic, Ginger, Methika, Pippali and Turmeric. These spices also used for prevention and management of diabetes and associated complications.

KEY WORDS: Spices, Diabetes Mellitus, Anti-diabetic and Anti-inflammatory

INTRODUCTION:

Diabetes mellitus

It is a chronic disorder of carbohydrate, protiens, and fat metabolism resulting from insulin deficiency or abnormality in the use of insulin.

Diabetes is the world's fastest growing chronic diseases currently 246 million people affects worldwide.

The number expected to rise to 380 million by 2025.

In 2007, the five countries with the largest number of people with diabetes are india (40.9 million), china (39.8 million), the united state (19.2 million), Russia (9.6 million) and Germany (7.4 million)

Each year 3.8 million death are attributable to diabetes

Every 10 seconds two people develop diabetes

Diabetes is fourth leading cause of global health.

Up to 60% of type 2 diabetes is preventable by adopting a healthy diet and increase physical activity.

Diabetes is the largest cause of kidney failure in developed countries, 10 to 20 % people with diabetes will die of renal failure.

It is estimated that more than 2.5 million people worldwide are affected by diabetic retinopathy.

Cardio vascular disease is the major cause of death in diabetes.

People with type 2 diabetes are two times more prone to heart attack or stroke.

SPICES

Spices are aromatic pungent substances condiments are processed spices made in sauce or relish. Spices and condiments are used extensively as flauvarins they cause irritation of intestine and help in evacuation. Spices and condiments contains essential

oils and other active principle. Condiments mainly improve flavour of food and have very little food value. Spices are used as a dual purpose it help in preventing and controlling DM and also add flavour to food.it is easily available in globally.

ACCORDING TO MODERN SCIENCE TYPES OF DIABETES

1. Type 1 diabetes

Formerly known as Insulin Dependent Diabetes mellitus (IDDM).

- Autoimmune (Islet cell antibodies).
  1. Early introduction of cow's milk and cereals.
  2. Intake of medicine during pregnancy.
  3. Indoor smoking of Family members.
- Destruction of beta cells of the pancreas little or no insulin production.
- Requires daily insulin administration.
- May occur of any age, usually appears below age 15 years.

Type 2 Diabetes mellitus.

- Formerly known as non-insulin dependent Diabetes mellitus (NIDDM) probably caused by,
- Disturbance in insulin reception in the cells.
- Decrease number of insulin receptors.
- Loss of beta cell responsiveness to glucose leading to slow or decrease insulin release by the pancreas.
- Occurs over age 40 years but can occur in children.
- Common in overweight's or obese.

Gestational diabetes

A temporary metabolic disorder that any previously non diabetic women can develop during pregnancy, usually the third trimester. Hormonal changes contribute to this disease, along with excess weight and family history of diabetes. About 4 % of pregnant women develop gestational diabetes, according to the American Diabetes Association.

Secondary diabetes

Diabetes caused by another condition the many potential sources of secondary diabetes range from disease such as pancreatitis, cystic fibrosis, Down syndrome and hemochromatosis to medical treatment including corticosteroids, other immunosuppressive, diuretics and pancreactomy.

PRE-DIABETES VALUES

- Impaired fasting glucose (IFG)
  FPG: 100-125 mg /dl.
- Impaired glucose tolerance (IGT)
  OGTT: 140 – 199 md/dl
  HbA1c: 5.7 – 6.4 %.

ACUTE COMPLICATION OF DIABETES MELLITUS.

1. Diabetic keto-acidosis (DKA)
2. Insulin shock
3. Hyperglycemic, Hyperosmolar, Non ketotic (HH ONK) COMA.
4. Dawn Phenomenon.

COMPLICATION OF DIABETES.

Over time, untreated high blood glucose level will cause-

1. Increase risk of heart attack or stroke.
2. Blood vessel and nerve damage.
3. Eye disease or blindness.
4. Kidney disease.
5. Poor circulation (some time requiring limb amputation).
6. Poor wound healing
7. Impotence in men.

PREVENTION OF DIABETES MELLITUS

1. Regular physical activity
2. Maintaining a healthy weight
3. Making healthy food of choices
4. Managing Blood pressure.
5. Not smoking
6. Managing Cholesterol levels
7. No Alcohols.

Regular monitoring blood glucose level:

However the symptoms of diabetes may not appear until blood glucose level are higher, so some people may have diabetes without knowing about it.

ACCORDING TO AYURVEDA TYPES

1. Sahaja (Genetic) type-1
2. Apathya / Nimittaja (type -2)

Based on Dosha 20 type.

Kaphaja – 10
Pittaja – 6
Vataj – 4

CAUSATIVE FACTOR / HETU

"Aashyasukham swapnasukham dadhinigramyo odkanuprasaa pyaamsi

Navaanpanam gudvayikritam ch prameha hetu kapahakrich swaeamn ". (charak chi. 7)

- Inactivity, laziness, lack of exercise.
- Excessive sleep.
- Meat and soup of the domestic, aquatic & marshy land animals.
- New cereals & drinks.
- Products of jaggery & sugar.
- All other kapha promoting things.

PATHOGENESIS / SAMPRAPTI (ACCORDING TO ATURVEDA).

Due to causative factors

↓

Doshas get imbalanced (specifically kledak kapha, pachak pitta, samanvaya)

↓

Agni mandhya (dhatvagnimadhaya)

↓

Culminates all dushyas (specifically medodhatu)

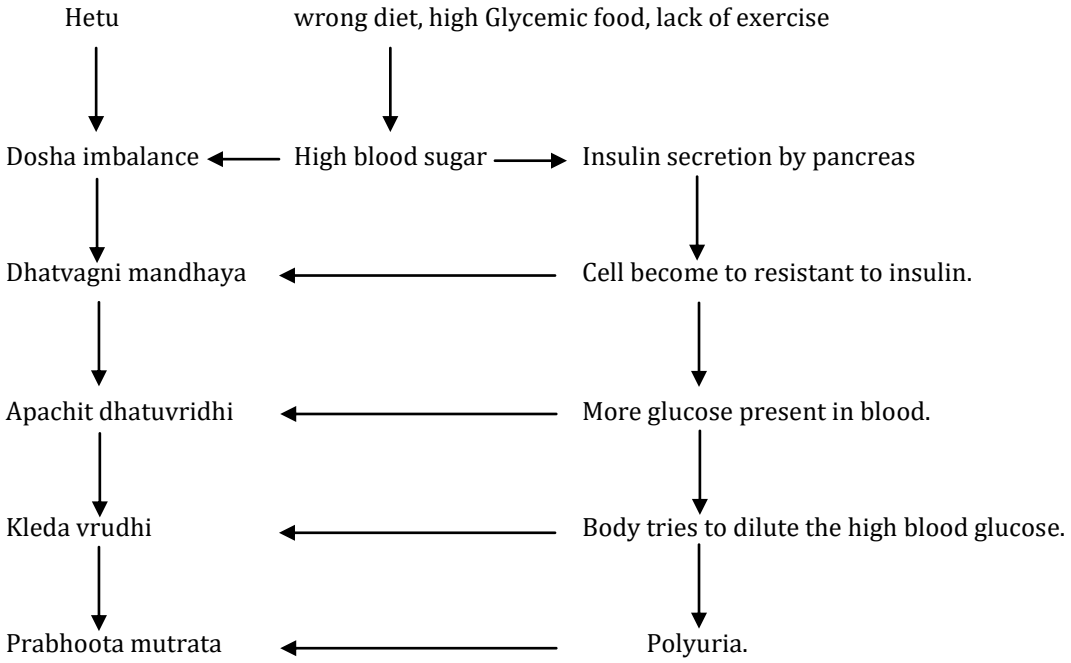
↓

Kleda vrudhi (unnecessary excessive body fluid oozed out from all dhatu).

↓

Body tries to excrete in the form of urine.

AYURVED and MODERN



SPICES USED IN THE MANAGEMENT OF DIABETES MELLITUS

1. Cinnamon: (Cinnamomum Zeylanicum and C. verum).

Family: Lauraecae.

Cinnamon is commonly known as "Dalchini" in hindi. Phenolic extract of cinnamon (C. Zeylanicum) shows the insulin potentiating activity. Thus its supplementation is important for in – vivo glucose control and insulin sensitivity in humans while another species (C. verum) exhibits, hypoglycemic activity by enhancing the insulin activity. Along with this it also shows increase in lipid metabolism and antioxidant status.it contains alkaloids, proteins, tannins, cardiac glycosides and saponins. An aqueous extract of C. verum bark improved insulin resistance and prevented lipid abnormalities in fructose fed diabetic rats.

2. Cumin Seeds: (Cuminum cyminum) And Black Cumin (Bunium Persicum Boiss).

Family: Umbelliferae.

Oral administration of this seeds shows anti-obese and hypoglycemic activity in preclinical experiments a findings of 65 weeks study perform in rats in the

the management of diabetes it is more effective than glibenclamide. Hypoglycemic effect of cumin seeds also observed in normal rabbits [9]. Black cumin are proved clinically effective as anti –obesity and hypoglycemic.

3. Garlic (Allium Sativum)

Family: Liliacae

Since a long time it is used and we all known for good carminative, it is an anti – obese spice. Garlic, also known as "Lahsun" is essential dietary spice component cultivated throughout India and familiar for its various uses. Garlic contains S-allyl cysteine sulphoxide, asulfur containing amino acid, which produces significant blood glucose lowering activity in animal studies. Apart from hypoglycemic effect it is also reported to have antihypertemsive and atherosclerosis activity.Allium sativum have capacity to stimulate the production of insulin by pancreatic beta cells and this keeps diabetes under control.[13]

4. Ginger (Zingiber officinale)

Family: Zingiberacae.

Zingiber officinale is also known as Ginger and is dietiary spice component widely cultivated, used throughout in India which possesses hypoglycemic activity. Animal experimentation has done on Ginger shows its significant antidiabetic activity on type 1 diabetes.It also produces a significant increase in insulin levels and a decrease a fasting glucose level in diabetic rats. Ginger is commonly used spice in tea preparation all over India.[13]

5. Methika (Trigonella Foneum graecum)

Family: Leguminosae.

Trigonella foneum is also known as fenugreek which is used as food and for medicinal purpose. It is good source of many essential elements such as iron, phosphorus, sulphur etc. It is a known hypoglycemic agent used in traditional Indian medicinal practice. Extract prepared with different parts of the plant of methika shows significant hypoglycemic activity. An amino acid "4 – hydoxyleucine" is a novel component from fenugreek which reportedly increases glucose induced – insulin resistance. It reduces the blood glucose level along with the elevated TC, TG but not affecting HDL.[11]

6. Pippali (Piper nigrum and P. longum)

Family: Piperacae.

Black pepper is well acknowledged as "Pippali" in India is often used as spice in various food preparations for its taste and carminative properties. In combination with some other herbs it is used in various antidiabetic polyherbal formation. Piperine, the active alkaloid of Piper nigrum has been evaluated for its glucose regulatory efficacy and daily oral administration for 15 days lowered blood glucose concentrations and hepatic glucose -6-phospates enzyme activity.[12]

7. Turmeric (Curcuma longa)

Family: Zingiberacae.

It reduces effect of enzymes responsible for converting dietary carbohydrates into glucose, leading to a decrease in blood glucose level. In animal studies curcumin shows reduction in blood glucose, haemoglobin and glaciated haemoglobin levels. Ferulic acid or 4- hydroxyl-3- methoxy-cinnamic acid found in turmeric exhibits hypoglycemic action in both type 1 and type 2 diabetes. Some amide compound derived from ferulic acid has evidence for insulin secretion from pancreatic beta cells.[13]

OBJECTIVES

Diabetes mellitus is associated with significant morbidity and mortality, its prevalence is increasing worldwide, Although conventional anti-diabetic agents are known to ameliorate the symptoms of diabetes, they also may cause adverse effects, the purpose of this review was to organize and discuss various studies that have been previously conducted indicating the efficacy of spices in diabetes mellitus.

METHODS

A comprehensive English and Ayurvedic literature search was conducted using various electronic, search database, different search terms were used and an advanced search was conducted by combining all the search fields in abstract, keywords and tittles.

DISCUSSION:

Diabetes mellitus also known as simply diabetes is a group of metabolic disease in which there are high blood sugar level over a prolonged period. This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. Globally, as of 2013, an estimated 382 million people have diabetes worldwide, with type 2 diabetes making up about 90% of cases. Spices can play vital role in lowering of blood sugar level, as our Vedic

literatures like charak samhita already reports the use spices, herbs and their derivatives for treatment of diabetes mellitus. More than 400 plants have been incorporated in approximately 700 recipes which are used to treat diabetes mellitus in almost two thirds of world population. A large number of in vivo studies have been conducted on animals to test the claimed activity have demonstrated the hypoglycemic property of many plants, already reported in various literatures. Various medicinal plant have been reported for the anti-diabetic actions.

CONCLUSION:

Diabetes mellitus is a metabolic disorder which can be considered as a major cause of high economic loss which can in turn impede the development of nations moreover, uncontrolled diabetes leads to many chronic complications such as blindness, heart failure and renal failure. In order to prevent this alarming health problem, the development of research into new hypoglycemic and potentially anti-diabetic agent is of great interest. In conclusion, this paper has presented list of anti-diabetic spices used in the treatment of DM. It shows that this spices have hypoglycaemic effects and also easily available in global market.

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