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Ayurvedic Medicine in India Today - Continuity & Change in the Treatment of Diabetes Mellitus

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ABSTRACT

Diabetes mellitus was recognised by ancient Indian medical scientists as a resistant disease. The origin, course, and treatment options for the disease are influenced by a variety of dietary, behavioural, environmental, and hereditary variables. In Ayurvedic literature, all of these traits are well discussed. For each kind and stage of the illness, a variety of therapeutic approaches are recommended. Medical practitioners are increasingly relying on more rigorous scientific evidence to back up traditional claims about the effectiveness of medicines from single plants and compound compositions. Despite recent advances in medical science, several challenges remain in the management of diabetes. These issues need further research into hitherto unexplored areas of medical knowledge. There are several conditions for which Ayurveda offers safe, efficient, and comprehensive remedies. One of the most challenging aspects of evaluating these medicines is finding an Ayurvedic research model that combines Ayurvedic concepts and systems. A number of Ayurvedic treatments and therapies have been shown to be scientifically effective and safe despite the difficulties and limitations of these studies.

Keywords: Diabetes, lifestyle, Hypoglycaemic, Ayurvedic Medicine, Insulin

INTRODUCTION

People with diabetes mellitus (madhumeha) have elevated blood glucose levels as a result of deficiency of insulin synthesis or action, or both. It is possible for diabetic problems to emerge in a broad variety of organs and systems. It's important to note that there are two forms of diabetes: insulin-dependent and non-insulin-dependent (NIDDM). Type I diabetics have no insulin at all, while type II diabetics have insulin resistance, decreased insulin

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secretion, and increased glucose generation. Type I diabetics have no insulin. Increased thirst and hunger are two of the most common symptoms of diabetes mellitus (increased hunger). Over 30 million people had diabetes in 1985, but by 2000 that figure had climbed to 177 million, with forecasts predicting that more than 360 million people would be affected by the condition in 2030. The probability of contracting this disease rises with age. Obesity and a change in lifestyle are to blame for the growth in Type II diabetes. Type II diabetics may use a variety of medications to manage their blood sugar levels, but type I diabetics only have access to insulin as a treatment option. For treatment to maintain blood sugar levels in balance, an increase in drug dose is quite rare. Insulin-dependent diabetes may develop in those who are genetically predisposed to it. In Ayurveda, root cause elimination is the primary treatment strategy. One of the most important aspects of ayurvedic management is biocensing (Ayurvedic licencing) (palliation). As a result, herbal and herbo-mineral treatments have become more popular, as have good food and frequent exercise.

HISTORICAL ACCOUNT AND AYURVEDIC APPROACH

Diabetes (madhumeha) has a long history dating back to the year 1000 BC (Caraka Samhita). There is much Ayurveda literature that addresses the illness and how it is treated in great detail. There are two texts in the Caraka Samhita (1000 BC) and Susruta Samhita (1000-600 BC) that describe Madhumeha as the patient's frequent flow of sweet and astringent urine. Diabetes is one of eight Ayurvedic ailments that are difficult to cure due to its refractory nature (asthamahagada). It's a combination of a lot of things. This condition's onset is thought to be influenced by a variety of factors, including diet, lifestyle, genetics, and the environment. Eating too much, sedentary lifestyle, and the intake of certain foods rich in water resources (anupa desha), freshly harvested foods and grains, and the use of sweet food items are all kapha dosha aggravating features (Table 1 and 2). It has been suggested that both inherited factors (jata-pramehi) and genetic association (beeja dosha) might be responsible for the disease.

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Table 1. Therapeutic Modalities and Advocacy for Diabetes

Principles	Advocacy
Nidana parivarjana- Avoidance of etiological factors	Faulty lifestyle, faulty dietary habit, mental stress, day sleep and awakening in night.
Aahara - Diet	Katu (spicy), Tikta(bitter), Kashaya Rasa(astringent), Ushna(hot), Laghu(light), Ruksha(dry)
Vihara- lifestyle modification	Aasanas , exercise
Aushadha - Medical Management	Katu(spicy) Tikta(bitter), Kasya Rasa(astringent)

Table :2 Diet recommended in diabetes according to Ayurveda

Type of Diet	Name
Cereals	Old rice (*Oriza Sativa)* Rice which crops within 60 days Barley (*Hordeum vulgare*) Godhuma (wheat) Kodrava (grain variety–*Paspolum scrobiculatum*)
Pulses	Adhaki (red gram-Cajamus cajan) Kulattha (horse gram) Mudga (green gram) should be taken with bitter and astringent leafy vegetables.
Vegetables	*Green Banana* *Tanduleyaka (Amaranthus spinosus)* *Matsyakhshi (Alternanthera sessilis)* *Bitter vegetables (Tiktasakam) like* *-Methica (Methi- Fenugreek leaves)* *-Karavellaka (Bitter gourd)*
Fruits	*Orange* *Watermelon* *Apple, Jambu (Syzigium cumini)* *Kapitha (Feronia limonia)* *Amlaki (Emblica officinalis)*
Oils	*Nikumbha (Danti- Baliospernum montanum), Ingudi (Balanitis aegyptiaca), Atasi (Linum usitatisimum), Sarsapa (Mustard).*

Obese-strong people (sthula and balavan, in Ayurveda) are classified as pramehi, whereas thin-weak people are classified as pramehi (krisha). Bio-cleansing treatments (panchakarma) are the first step in the treatment of obese and diabetic patients (apatarpana chikitsa). Patients with type 2 diabetes who are thin or weak might benefit from a milder cleaning treatment, followed by a therapy to replenish the body and particular care of their condition (santarpana chikitsa). Therapy and food recommendations for both categories of diabetes differed. Diabetes treatment is incomplete without regular physical activity and a well-balanced diet.

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Foods are recommended depending on the patient's age and body type as well as the season, climate, and other considerations. Dietary foods produced with yava (barley), mudga (green gramme), and purana sali are beneficial to diabetics (ancient rice). Diabetes mellitus may be treated with a variety of single drugs and compound formulations, as shown in Table 3.

Table 3. Some single plant drugs and compound formulations used in Diabetes mellitus

Single Plant drugs	Compound formulations
Amalaki (Emblica officinalis)	*Chandraprabha Vati*
Meshasringi (Gymnema sylvestre)	*Silajitwadi Vati*
Karavellaka (Momordica charantia)	*Vasanta Kusumakara Rasa*
Methika (Trigonella foenum-graecum)	*Trivanga Bhasma*
Shilajit (Black bitumen)	*Phalatrikadi Kwatha*
Vijaysar (Pterocarpus marsupium)	*Vangabhasma*
Jambu (Syzygium cumini)	*Nisamalaki Curna*
Tejpatta (Cinnamomum tamala)	*Kathakakhadiradi Kwatha*
Tvak (Cinnamomum zeylanicum)	*Mehari Vati*
Guduci (Tinospora cordifolia)	*Saptacakra Ghana Vati*
Bimbi (Coccinia indica)	
Khadirasara (Acacia catechu)	
Katphala (Myrica esculenta)	
Kakamaci (Solanum nigrum)	
Devadaru (Cedrus deodara)	

HYPOGYCEMIC POTENTIAL OF AYURVEDIC PRINCIPLES BASED ON SCIENTIFIC EVIDENCE

Research has shown that Ayurvedic medicines may be both safe and effective, with the following examples:

Experimental Pharmacology

Animal experiments on streptozotocin-induced diabetes demonstrated that the hypoglycemic effects of an aqueous extract of the Aegle marmelos (Bilva) leaf supported the extract's potential as an oral insulin replacement. ethanol extracts of Aegle marmelos (Bilva) leaves were tested in albino rats to see whether they might lower blood glucose levels via lowering

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insulin levels. Both strains had dose-dependent hypoglycemic effects. It was shown that in the first half an hour, blood glucose levels dropped the most in those taking the sweet version (250 and 500 mg/kg) compared to those taking the bitter type (eight hours and up to 24 hours afterwards). A 250 mg/kg aqueous extract of Aegle marmelos (Bilva) seeds was provided after a two-hour glucose tolerance test in the laboratory to normal healthy rats, subnormal rats, and mildly diabetic rats, respectively.

Fasting glucose levels in diabetic rats were lowered by 60.84 percent after 14 days of treatment with 250 mg/kg of glucagon. Increased HDL levels and lowered LDL and triglyceride levels were also seen, as were lower total cholesterol levels. It has been shown that aqueous extract of Aegle marmelos seeds has an anti-diabetic and hypolipidaemic impact on diabetic rats. When given an ethanolic extract of Cinnamomum tamala (Tejapata) leaves, both normal and streptozotocin-induced hyperglycemic rats had significant decreases in plasma glucose levels. When streptozotocin was administered to diabetic rats, the animals showed significant reductions in hypercholesterolaemia and hypertriglyceridemia. Sugar tolerance tests showed that Cinnamomum zeylanicum (Tvak) bark aqueous solution lowered glucose levels after only one hour. Cinnamon extract (200mg/kg, b.w.) once daily for two weeks reduced fasting blood glucose levels in diabetic rats. Hypoglycemia was seen in rabbits fasting on Coccinia indica (Bimba) leaves and stems (20ml/kg) juice and decoction. When the plant's fruits were cooked, the results were similar.

The efficacy of ethanolic extracts of the plant and root of Coccinia indica (Bimba) to lower blood sugar levels in a range of experimental animals was investigated. For glucose-loaded animals, root extract alone decreased blood sugar levels, however for diabetic albino mice created by streptozotocin, all other plant extracts also reduced blood sugar levels. Gymnema sylvestre (Meshasringi) extract has been demonstrated to reduce blood glucose levels in mice with dexamethasone-induced hyperglycemia. Corticosteroid-inhibiting medication Ketoconazole produced the same result. Momordica charantia's watery extract has been proven in experimental and clinical tests to have anti-diabetic and adaptogenic activities (Karavellaka). The aqueous extract of the fruit was shown to be superior to the powdered

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form in treating diabetes. Numerous research have been carried out on rats fed fructose to determine the effects on body weight, blood sugar, insulin, and triglyceride levels of extracts from Momordica charantia (Karavellaka). After 15 days of fructose ingestion, blood sugar and insulin levels skyrocketed. Using Momordica charantia aqueous extract as an injection after a high-fructose meal significantly reduced blood sugar and insulin levels. Blood sugar levels and insulin levels in Alloxan-induced diabetic mice were dramatically reduced and increased after treatment with an ethanol extract of P. marsupium wood. The anti-diabetic herb Pterocarpus marsupium (Vijayasar) was tested in rats for its ability to prevent cataract formation.

The diabetic rats were given aqueous extract of Pterocarpus marsupium (1g/day) till the formation of cataracts to treat the diabetic rats. Opacity index, an indicator of how much weight, blood glucose, and anti-cataract activity was affected, was lowered by the plant extract. Alloxan-induced diabetic rats treated with Tinospora cordifolia (Guduchi) root extract for six weeks showed substantial reductions in blood and urine glucose, serum and tissue lipids. The alkaloid-rich fraction of Trigonella foenum-graecum L. (Methi) extracts lowered blood sugar levels in rabbits within two hours of treatment. When streptozotocin-induced diabetic rats were fed Trigonella foenum graecum (Methi) leaves, hyperglycemia, hypoinsulinaemia, and glycosylated haemoglobin levels were decreased. Diabetic rats are given methi to enhance their weight and liver glycogen while also affecting carbohydrate metabolic enzymes. We detected libenclamide-like properties in fenugreek leaf extracts. Blood sugar levels in healthy and diabetic rats were considerably lowered by an alcoholic extract of Trigonella foenum-graecum seed.

Clinical Studies

***Vijayasara* (*Pterocarpus marsupium*) in NIDDM**

An open-label study of Vijayasara's effectiveness in the treatment of newly diagnosed or untreated NIDDM was carried out in four Indian centres. After 12 weeks of treatment, 69 percent of the patients were able to control their blood sugar levels. At 12 weeks, the mean

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HbA1c decreased from 9.8% to 9.4%, a significant decrease (P0.001). Indicators in other labs were stable, and no adverse effects were seen.

Ayush-82 and Shuddha Shilajit

As part of a clinical intervention, 80 NIDDM patients received Ayush-82 (5gm thrice a day), Shuddha Shilajit (500mg twice a day), and a placebo for 24 weeks (n=80). Each time a person ate a meal, their blood sugar levels were measured for six weeks. Blood sugar levels dropped statistically significantly both while fasting and after eating.

Coccinia indica

This study (n=30) used aqueous extract of Coccinia indica as the active ingredient in NIDDM pills, which were delivered twice daily before meals for three months. The medicine was shown to dramatically lower the fat percentage to practically normal levels when hyperglycemia was controlled.

Ayurvedic Therapy in Diabetes Retinopathy

Tarpana with Patoladi ghrita and Dhanvantara Kwatha 20 mg, Punarnavasava 25 mg, Candraprabhavati 250 mg, and Nisamalaki 5 gm twice day dramatically improved the eyesight of diabetes retinopathy patients. Symptoms of neovascularization, such as vision loss and localised haemorrhages, have vanished.

Ayush-82 – There were statistically significant decreases in blood sugar levels (n=350) in a clinical study using an Ayurvedic hypoglycemic formulation of Mangifera indica seeds, Mordica charantia seeds, Syzygium cumini seeds, and Gymnema sylvestre leaves (Ayurveda).

Objectives of the study

1. An Ayurvedic-based herbal formulation is the subject of the current research, which attempts to evaluate its therapy efficacy.
2. To evaluate four different Ayurvedic formulas for their effectiveness,.
3. To study the effectiveness of a personalised mix of treatment and herbal supplement

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Efficacy of certain Ayurvedic Plant drugs

CCRAS Institutes conducted a total of 862 studies on the effectiveness of four distinct Ayurvedic formulations for Madhumeha between 1998 and 2007. There was a therapeutic response of 67.61 percent in the group with interventions of Karela (Momordica charantia) and Jamun (Syzygium cumini) seed extract (n=247); in the Bilva (Aegle marmelos), Neem, Tulsi, and Kalimarich groups (n=89) of 64.05 percent each; and in the Nisha Amalaki Churna and Meditation & Yoga groups (n=109).

Nishamalaki

100 NIDDM patients (n=100) between the ages of 31 and 70 were administered 1 gm of Nishamalaki twice daily with water for six weeks in an open clinical research study (i.e. 100mg or more in FBS). The drug's hypoglycemic impact is just fair, according to the research.

Amrita-Pippali-Nimba Yoga

Separation into three groups was performed on a group of 50 diabetics. Nonimba Yoga (n=15) and Pippali Yoga (n=14) were both included in Group C (n=8), which included a total of eight participants. Nimba Yoga and Amrita Pippali were used as a placebo control in the study of Group C (n=8): Nimba Yoga and Group C (n=8): Amrita Pippali and Group C Add Amrta, Pippali, and Nimba Yoga significantly reduced fasting and postprandial blood sugar levels compared to placebo in groups A and B.

Coccinia cordifolia extract on Newly Detected Diabetic Patients

For 90 days, 60 newly diagnosed type 2 diabetics received 1 g of alcoholic extract of Coccinia cordifolia in a double-blind, placebo-controlled, randomised study, with placebo and experimental groups being randomly allocated. Compared to the control group, the experimental group's fasting and postprandial blood glucose levels had decreased by an average of 15.6% and 18.5% by day 90, respectively.

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TRANSLATIONAL APPROACH AND WAY FORWARD

There is no substitute for a detailed evaluation of the problem, followed by a meta-analysis of study results. In order to put what we know into practise, we need further research on the use of Ayurvedic medicines that aren't part of a modern treatment plan, as well as on the interactions between different drugs. By integrating Ayurvedic and biological ideas, a systems approach might be utilised to validate Ayurvedic medications and processes. When used in conjunction with well-thought-out research strategies, a strategy like this may make it simpler to produce genuine evidence that has a greater potential for application.

CHALLENGES AND SCOPE

In Ayurveda, the focus is on the whole person. Clinical trial design, diagnosis and treatment, clinical effectiveness outcomes evaluation and medication interactions all include a wide range of ideas and complex procedures, and as a result, this method presents several difficulties for researchers.

1. Quality Control and Standardization
2. Dosage form/delivery system complexity
3. A wide range of ideas
4. Complicated methods in
    a. Clinical Trial Design,
    b. Diagnosis and Therapy, and
    c. Clinical Efficacy/Outcome Measures
5. Drug interactions and therapies involving many systems
6. Research into the mechanisms of action (MoA)
7. Ayurveda and biomedicine techniques synchronised

To design Ayurvedic research techniques, a suitable model that meets the problems listed above is essential. Well-designed experiments that demonstrate the safety, biological activity, pharmacological interactions, and the most probable mechanism of action may give strong scientific evidence that may lead to clinical research. Experiments may be a clear insight with excellent translational value from clinical trials employing proper models, research strategies, and scientific standards.

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CONCLUSION

Diabetes mellitus has long been recognised as a condition caused by a person's inability to control their diet and exercise habits. Several hypotheses have been put out in an attempt to shed light on the idea and how it should be handled. To better understand the disease's cause and treatment, current biological concepts and cutting-edge scientific instruments have been used. Certain hereditary characteristics have been found, and new medicines are being launched to control the condition and avoid complications. For the treatment of diabetes, a variety of Ayurvedic ideas and principles are shown, and efforts are being made to gather evidence on how widely and effectively these approaches may be used. Research on screening medicinal plants and dosage forms for hypoglycemic activity has been limited, and only a handful of these investigations have gone to clinical research stage. Additionally, studies with a wide range of research objectives and evaluation criteria may only be able to provide a limited amount of data about the extent, effectiveness, and efficiency of medication and treatment usage. This technique has a number of drawbacks when it comes to creating suitable clinical trial models and planning relevant research programmes.

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