



Review of *Madhumehari Churna*: An ayurvedic polyherbal formulation used in management of Diabetes mellitus

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Abstract: Introduction - Diabetes mellitus encompasses many metabolic and endocrine abnormalities marked by chronic hyperglycaemia, primarily stemming from deficiencies in insulin secretion, action or both. This condition is often attributed to bad lifestyle factors such as excessive intake of carbohydrates and fat in diet, inadequate physical activity and stress. In *ayurveda*, diabetes mellitus comes under *prameha* which is classified among serious ailments. Various interventions including single and compound formulations are showing good results in pre-diabetic and newly diagnosed diabetic cases nowadays. Alternative medicine can complement modern medicine in managing complex diabetes cases too. Madhumehari Churna is one of such formulations which shows promising results in the management of diabetes and related health issues. The objective of this article is to review the properties, actions and hypoglycaemic activity of contents of Madhumehari Churna.

Materials and Methods- This manuscript is prepared by collecting relevant data from Charaka Samhita, Sushruta Samhita, Bhavaprakasha, other texts and online peer reviewed journals. All the textual sources were systematically searched for properties and action of each ingredient of Madhumehari Churna. The information regarding hypoglycemic activity was procured from online peer reviewed journals. The results obtained were compiled, organised and analysed.

Result- The herbs comprising Madhumehari Churna exhibit diverse properties. Various actions exhibited by the herbs are inhibition of starch conversion into sugar, slowing glucose absorption in the gut, enhancing glucose tolerance and insulin sensitivity, lowering lipid levels and possessing antioxidant effects.

Conclusion- This formulation has hypoglycaemic action and helpful in controlling the symptoms of the disease and therefore it can be used in diabetes management.

Keywords: Madhumehari churna, Madhumeha, diabetes mellitus, polyherbal, hypoglycemic action

INTRODUCTION

Diabetes mellitus is counted as one of the major lifestyle diseases. Diet rich in carbohydrates and fats, less physical activity and stress are the common causative factors. Type 1 Diabetes mellitus (T1DM) and type 2 Diabetes mellitus (T2DM) are the primary classifications.^[1] Apart from these types, monogenic, gestational and secondary diabetes mellitus are also there.^[2] In India 77 million people had diabetes in 2019, which

is expected to rise to over 134 million by 2045.^[3] The treatment goals are alleviating symptoms associated with hyperglycaemia, mitigating or eliminating the long term micro-macro vascular complications and facilitating patients to have wellbeing.^[4] Considering these treatment approaches, *ayurveda* interventions can complement modern medicine in managing complex diabetes cases, while also demonstrating stand alone effectiveness in managing less complicated patients in the prediabetic stage.

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In *ayurveda*, diabetes mellitus comes under *prameha* which is classified among eight serious ailments.^[5] It encompasses a spectrum of conditions, predominately associated with liquefied *kapha* and multiple *dooshya*^[6], ultimately affecting *mootravaha srotas*.^[7] It is etiologically classified into two types which are *sahaja* (hereditary) and *apathya-nimittaja* (acquired).^[8] *Sahaja prameha* arises due to *beeja-dosha* (genetic predisposition) which can be correlated with Type 1 diabetes. *Apathya-nimittaja prameha* stems from dietary and lifestyle factors which is similar to Type 2 diabetes mellitus. Furthermore, based on the predominance of *dosha*, *prameha* is further categorized into three major types that is *vaataja*, *pittaja* and *kaphaja prameha*.^[9]

Madhumehari churna is a polyherbal formulation mentioned in group no 6 (*Churna*) on page no.141 in “The Ayurvedic Formulary of India” Part-III, published in 2011 by Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy

(AYUSH), Government of India, New Delhi. This drug is an *anubhoota yoga* (clinically experienced) prepared by GMP certified pharmacy of National Institute of Ayurveda, Jaipur.^[10] It consists of twelve herbs and its important therapeutic uses are *prameha* (increased frequency and turbidity of urine), *madhumeha* (diabetes mellitus), *ikshumeha* (glycosuria) and *laalaameha* (albuminuria) in the dose of 3-6grams with water. The widespread use of Madhumehari Churna for treating diabetes, particularly in Rajasthan, is notable. The powder is obtained after proper cleaning, drying, powdering and sieving each drug mentioned in the *yoga*. This review article delves into the comprehensive scientific analysis of each component of Madhumehari Churna, elucidating their individual properties in detail. The general information of the formulation is given in Table No.1. The properties and actions are mentioned in Table No. 2 and 3 respectively.

Scientific review of Madhumehari churna

Review as per Ayurveda

Table No. 1
General information of the ingredients of Madhumehari Churna

S.No.	Name of herb	Botanical Name	Family	Part used
1.	<i>Jambu</i> ^[11]	<i>Syzygium cumini</i>	<i>Myrtaceae</i>	<i>Beeja</i> (Seed)
2	<i>Aamra</i> ^[12]	<i>Mangifera indica</i>	<i>Anacardiaceae</i>	<i>Phala-asthi majjaa/ Beeja-majja</i> (seed kernel)
3	<i>Kaaravellaka</i> ^[13]	<i>Momordica charantia</i>	<i>Cucurbitaceae</i>	<i>Phala</i> (Fruit)
4.	<i>Meshasrngi</i> ^[14]	<i>Gymnema sylvestra</i>	<i>Asclepiadaceae</i>	<i>Patra</i> (Leaf)
5.	<i>Methika</i> ^[15]	<i>Trigonella foenum- graecum</i>	<i>Leguminaeae</i>	<i>Beeja</i> (Seed)
6.	<i>Bilva</i> ^[16]	<i>Aegle marmelos</i>	<i>Rutaceae</i>	<i>Patra</i> (Leaf)
7	<i>Nimba</i> ^[17]	<i>Azadirachta indica</i>	<i>Meliaceae</i>	<i>Beeja</i> (Seed)
8.	<i>Sunthi</i> ^[18]	<i>Zingiber officinale</i>	<i>Zingiberaceae</i>	<i>Kanda</i> (Rhizome)
9.	<i>Misreya</i> ^[19]	<i>Foeniculum vulgare</i>	<i>Apiaceae</i>	<i>Phala</i> (Fruit)
10.	<i>Swarnapatra</i> ^[20]	<i>Cassia angustifolia</i>	<i>Leguminaeae</i>	<i>Patra</i> (Leaf)
11.	<i>Balaa</i> ^[21]	<i>Sida cordifolia</i>	<i>Malvaceae</i>	<i>Beeja</i> (Seed)
12.	<i>Babula</i> ^[22]	<i>Acacia arabica</i>	<i>Leguminaeae</i>	<i>Phala</i> (Fruit)

Table No. 2
Properties of the ingredients of *Madhumehari Churna*

S.No.	Drug Name	Rasa	Guna	Veerya	Vipaaka	Effect on Dosha		
						V*	P	K
1.	<i>Jambu</i>	<i>Kashaaya</i> (astringent) <i>Madhura</i> (sweet) <i>Amla</i> (sour)	<i>Laghu</i> (light) <i>Rooksha</i> (dry)	<i>Seeta</i> (cold)	<i>Katu</i> (pungent)		*	↓
2.	<i>Aamra</i>	<i>Kashaaya</i> ,	<i>Laghu</i> , <i>Rooksha</i>	<i>Seeta</i>	<i>Katu</i>	↓	↓	
3.	<i>Kaaravellaka</i>	<i>Katu</i> , <i>Tikta</i> (bitter)	<i>Laghu</i>	<i>Ushna</i> (hot)	<i>Katu</i>		↓	↓
4.	<i>Meshaṅgi</i>	<i>Kashaaya</i> , <i>Tikta</i>	<i>LaghuRooksha</i>	<i>Ushna</i>	<i>Katu</i>	↓		↓
5.	<i>Methika</i>	<i>Katu</i>	<i>SnigdhaLaghu</i>	<i>Ushna</i>	<i>Katu</i>	↓		↓
6.	<i>Bilva</i>	<i>Kashaaya</i> , <i>Tikta</i>	<i>LaghuRooksha</i>	<i>Ushna</i>	<i>Katu</i>	↓		↓
7.	<i>Nimba</i>	<i>Tikta</i> , <i>Kashaaya</i>	<i>Laghu</i>	<i>Seeta</i>	<i>Katu</i>		↓	↓
8.	<i>Sunthi</i>	<i>Katu</i>	<i>Laghu</i> <i>Snigdha</i> (unctous)	<i>Ushna</i>	<i>Madhura</i>	↓		↓
9.	<i>Misreya</i>	<i>Madhura</i> , <i>Katu</i> , <i>Tikta</i>	<i>Laghu</i> <i>Snigdha</i>	<i>Seeta</i>	<i>Madhura</i>	↓	↓	
10.	<i>Swarnapatri</i>	<i>Katu</i> <i>Tikta</i> , <i>Madhura</i> , <i>Kashaaya</i>	<i>Laghu</i> , <i>Rooksha</i> , <i>Teekshna</i> (sharp)	<i>Ushna</i>	<i>Katu</i>	↓	↓	↓
11.	<i>Balaa</i>	<i>Madhura</i>	<i>Laghu</i> , <i>Snigdha</i> , <i>Picchila</i> (slimy)	<i>Seeta</i>	<i>Madhura</i>	↓	↓	
12.	<i>Babula</i>	<i>Kashaaya</i>	<i>Guru</i> (heavy) <i>Rooksha</i>	<i>Seeta</i>	<i>Katu</i>		↓	↓

*V-Vaata P-Pitta K-Kapha ** ↓ - pacifies

Table No. 3
Actions of the ingredients of *Madhumehari Churna*^[23]

S. No.	Drugs	Actions and uses
1.	<i>Jambu</i>	<i>Pramehaghna</i> (useful in urinary disorders), <i>Krimidoshaghna</i> (useful in worm infestation), <i>Mootra-sangraahi</i> (antidiuretic)
2.	<i>Aamra</i>	<i>Pramehaghna</i> , <i>Kaphaghna</i> (pacifies <i>Kapha</i>), <i>Balya</i> (strengthening), <i>Sukhakara</i> (contenting), <i>Hrdya</i> (relishing), <i>Agnivardhaka</i> (improves digestive power)
3.	<i>Kaaravellaka</i>	<i>Pramehaghna</i> , <i>Bhedaka</i> (facilitates defecation by breaking feces into pieces), <i>Kaphaghna</i> , <i>Pittaghna</i> (pacifies <i>Pitta</i>), <i>Anulomaka</i> (facilitates the downward movement of <i>vaata dosha</i> and <i>mala</i>), <i>Deepana</i> (improves digestive power)
4.	<i>Meshaṅgi</i>	<i>Pramehaghna</i> , <i>Deepana</i> , <i>Sramsana</i> (forceful evacuation of the feces), <i>Sleshmaghna</i> , <i>Deepana</i>
5.	<i>Methika</i>	<i>Agnideepana</i> , <i>Kaphaghna</i> , <i>Balya</i> , <i>Daaha-prasamana</i> (pacifies hotness), useful in <i>ajeerna</i> (indigestion)and <i>Agnimaandhya</i> (weak digestive capacity)
6.	<i>Bilva</i>	<i>Vaata- kaphanaśaka</i> (pacifies <i>Vaata</i> and <i>Kapha</i>), <i>Anulomaka</i> , <i>Deepana-Paacana</i> , <i>Balya</i>
7.	<i>Nimba</i>	<i>Pramehaghna</i> , <i>Kaphapitta-śaamaka</i> , <i>Rocana</i> (appetite enhancer), <i>Daaha-prasmana</i> , <i>Vednaasthaapana</i> (normalises sensation), <i>Kandughna</i> (relieves itching), <i>Cakshushya</i> (beneficial for eyes)
8.	<i>Sunthi</i>	<i>Bhedana</i> , <i>Ruci-kaaraka</i>
9.	<i>Misreya</i>	<i>Agnimaandya-hara</i> , <i>Vedanaasthaapana</i>
10.	<i>Swarnapatri</i>	<i>Kaphavataśaamaka</i> , <i>Mrdu-recani</i> , <i>Kaayaśodhini</i> (removes feces and <i>Dosha</i> from body)
11.	<i>Balaa-beeja</i>	<i>Balya</i> , <i>Rasaayana</i> (rejuvenator), <i>Vrshya</i> (aphrodisiac), <i>Brmhana</i> (nourishing), <i>Hrdya</i>
12.	<i>Babula</i>	<i>Kaphapitta-hara</i> , <i>vranaropana</i> (healing of wound)

Review of hypoglycaemic Actions of the Ingredients of Madhumehari Churna

Jambu-beeja (*S. cumini*): The seeds of *jambu* contain an alkaloid named *jambosine*, and glycoside named *jambolin*, which curb the conversion of starch into sugar.^[24] Review studies report that its different parts have anti-inflammatory, antioxidant, anti-microbial, anti-bacterial and antifungal activities. It also has anti-diarrheal, gastroprotective and anti-ulcerogenic activities.^{[25][26]} The antioxidant effect is because of flavonoids in the seeds.^[27] The extracts of the seeds, leaves and bark reveal a moderate sugar lowering action.^[28] Its powder also decreases symptoms like polyuria, polydipsia and polyphagia.^[29]

Aamrasthi-majja (*Mangifera indica*): The seed kernel is a rich source of protein and gallic acid. Barks or leaves extracts of *M. indica* showed hypoglycaemic effect in an experimental study.^[30] It inhibits glucose absorption in the gut.^[31] An experimental study in diabetic rats indicates that it exerts a potent hypoglycemic activity by suppressing oxidative and inflammatory processes and thus checking apoptosis of pancreatic β cell, enhancing their function and improving metabolism of hepatic glucose.^[32]

Kaaravellaka (*Momordica charantia*): *M. Charantia* is a well known dietary substance and traditional medicine as well used for treatment of diabetes.^[33] It has bioactive compounds which lower high blood sugar levels, improve secretion of insulin and amplify function of β -cell.^[34] Its use has markedly improved glucose tolerance and insulin sensitivity in some experimental studies in rats.^[35]

Meshasrngi (*Gymnema sylvestre*): It constitutes phytochemicals like glycosides, saponins, flavonol, *gymnemanol* and *gurmarin*. Various activities like hypoglycemic, anti-inflammatory, anti-oxidative and lipid-lowering have been reported. It is also useful in treatment of drug-induced liver injury.^[36]

It pacifies *kapha* and is very useful in *prameha*.^[37] The powder of its leaves is used as medicine or as dietary ingredient in diabetes insipidus also.^[38] The extract of its leaves have been reported to interfere with the perception of sweet taste by blocking taste buds on the tongue. It may limit the intake of sweet foods by making it less appealing and thus helping in controlling diet and hence diabetes. It also helps in insulin secretion and cholesterol reduction.^[39]

Methika (*Trigonella foenum-graecum*): The hypoglycaemic mechanism of fenugreek seed includes slow absorption of carbohydrates from the intestines, reduction in glucose transport and modulation in peripheral glucose utilization. Result of a clinical study shows that the fenugreek seed has an influence on lipid metabolism.^[40]

Bilva-patra (*Aegle marmelos*): The extract of *A. marmelos* has antioxidant activities.^[41] Leaf and callus extracts produced significant decreases in blood sugar level in a study on streptozotocin induced diabetic rabbits.^[42] In another study on diabetic rats, its methanolic extract was found to decrease blood sugar by lowering oxidative stress produced by alloxan.^[43]

Nimba (*Azadirachta indica*): The aqueous extract of leaves of *A. indica* has shown significant hypoglycaemic effect in Type 1 and type 2 diabetes mellitus. It also enhanced glucose tolerance.^[44] Neem leaf extract promotes wound healing in diabetic foot.^[45] Alcoholic extract has also shown hypoglycemic activity in Wistar albino rats.^[46]

Sunthi (*Zingiber officinale*): Ethanolic extract of *Z. officinale* reduced body weights, levels of glucose and total cholesterol and revealed a protective effect in the development of metabolic syndrome in rats fed with high fat diet.^[47] It also has insulinotropic property and glucose-lowering potential.^[48]

Misreya (*Saunpha*) (*Foeniculum vulgare*): Its extract has shown hypoglycemic and antioxidant

activity in streptozotocin induced diabetes in experimental animals^[49] and restoration of cardiovascular, renal and hepatic complications of diabetes.^[50] Essential oil of *F. vulgare* in diabetic rats showed hypoglycaemic action and effect on other abnormalities brought about through its anti-oxidative effect.^[51]

Swarnapatri / Senna (*Cassia angustifolia* Vahl): Senna leaves work in multiple ways in long-term management of diabetes by correcting skin pathology, liver disorders and neurological complications.^[52] A study suggests that senna and pomegranate leaves extracts are helpful in the treatment of obesity and type-2 Diabetes mellitus.^[53] Leaf extract of *C. angustifolia* was found effective in ameliorating metabolic abnormalities associated with diabetes and retardation of risk of complications due to chronic hyperglycaemia.^[54]

Balaa-beeja (*Sida cordifolia*): It possesses anti-inflammatory, hypoglycemic and hepatoprotective activity as well. It also has analgesic action.^[55] The phytochemical analysis of the extracts of *S. cordifolia* reports the presence of different phytochemical components like sterols, terpenoids, alkaloids and flavanoids. The ethanolic and aqueous extracts showed dose dependent anti-diabetic activity as standard drug Glibenclamide. The extracts significantly controlled the blood glucose level, body weight loss and alteration in different lipid metabolic enzymes.^[56] All parts of *S. cordifolia* have shown hypoglycemic activity.^[57]

Babula-phala (*Acacia arabica* Willd): Extracts of *Acacia arabica* in STZ-induced diabetes rats improved glucose levels, lipid metabolism and oxidative stress by increasing insulin levels.^[58] In alloxan induced hyperglycaemic rats also, methanolic and aqueous extracts of *A. arabica* exhibited significant antihyperglycemic activities.^[59]

Case reports, case-series reports and clinical trials on *Madhumehari Churna*-The effect of *Madhumehari Churna* as a single drug or as a part of therapy in the dose of 5g with luke warm water before meal has shown hypoglycemic action and relief in symptoms of *madhumeha* in single case reports,^[60] as well as case-series reports^[61]. Successful treatment of diabetic foot ulcer with osteomyelitis was done with the help of it.^[62] Some clinical studies have also shown good effect in the management of *madhumeha*.^[63,64]

DISCUSSION

Prameha is characterized by frequent and turbid urination with many prodromal symptoms and complications. All three *doshas*, *gleshma* being predominant and *dooshyas* namely *medas*, *mamsa*, *kleda*, *sukra*, *rakta*, *vasaa*, *majja*, *laseeka*, *rasa* and *ojas* play a role in its pathogenesis. Diminution in *jatharaagni* and *dhaatwagni* leads to improper formation of *doshas* and *dhaatus* resulting in a number of symptoms.

Components of *Madumehari Churna* possess various actions and properties. The treatment approach in *prameha* involves balancing the *dosha*, particularly focusing on *kapha*, *deepana* (enhancing digestion), *virecana* (promoting purgation), *mootra-sangrahana* (reducing excessive urination) and *balya karma* (strengthening the physique). Since *kapha* aggravation is often a provoking factor and the initial manifestation in the pathogenesis of *prameha*, ten drugs in the formulation pacify *kapha*, means thereby addressing the root cause of the disease. It has been mentioned that there is *aamaavastha* (improper formation) of *dosha* and *dhaatu* and *dhaatwagni-maandya* too. Drugs like *kaarvellaka*, *meshasrngi*, *methika*, *sunthi*, *bilva*, and *misreya* are used to enhance digestion (*deepana*) and boost the *mandaagni*. The *kashaaya-rasa* drugs like *jambu-beeja*,

aamra, *meshasrngi*, *nimba*, *bilva* and *babulavak* are referred to their anti-diuretic properties, which help in *stambhana* and address excessive urination. *Daaha* (burning sensation) frequently surfaces as a notable grievance among the patients of *prameha*, notably impacting the feet and palms. *Daaha-prasamana*, designed to alleviate this discomfort, is prevalent in drugs like *methika* and *nimba*. *Balaa*, *misreya*, *aamra*, *jambu* are also helpful in this condition as they possess *seeta-veerya*. Since *prameha* is preceded by *medovaha-srotodushṭi* often and most of the patients are *sthoola* (*obese*) with aggravation of *dosha* particularly *kapha*. *Samsodhana karma* (purgation) is indicated here and hence this formulation incorporates drugs with purgative properties like *svarnapatri*, *kaarvellaka*, *meshasrngi* and *sunthi*. For patients experiencing weakness and pain, *balya* drugs like *aamra-beeja*, *methika-phala*, *bilva-patra* and *balaa-beeja* are of help. Additionally, beneficial effects on eye and skin health (*cakshushya* and *kandughana*) are observed with *nimba*.

Various herbs act on various levels of carbohydrate metabolism. *Meshasrngi* in particular starts acting on the tongue affecting the ability to taste sweet for some time. *Jambu* can inhibit the conversion of starch into glucose while herbs like *aamrasti*, *kaarvellaka* and *methika* can help reduce the absorption of glucose in the gut, thereby improving glucose tolerance. Some drugs such as *meshasrngi*, *methika*, *sunthi*, *balaa* and *babula*, can improve lipid metabolism and reduce fat. *Kaarvellaka* works on insulin metabolism either by decreasing insulin resistance or improving the hormone's glycemic activity. *Methika* works by delaying the emptying of the stomach. *Nimba* aids in wound healing and *svarnapatri* helps improve skin infections, as well as multiple neurological and physiological activities. Additionally antioxidants found in *jambu*, *meshasrngi*, *bilva*, *misreya*, and *babula*

can enhance the properties of free radical scavenging.

CONCLUSION

As per the data collected of each herb it can be concluded that the formulation inhibits starch to-glucose conversion, improves glucose tolerance, enhances lipid metabolism, impacts insulin metabolism and scavenges free radicals. In essence, the formulation is hypoglycemic, antioxidant and lipid-modulating, presenting a multifaceted approach to the management of diabetes mellitus. Since clinical studies are limited for generation of evidence, more clinical studies may be planned to explore its efficacy in various aspects and bridge the research gap.

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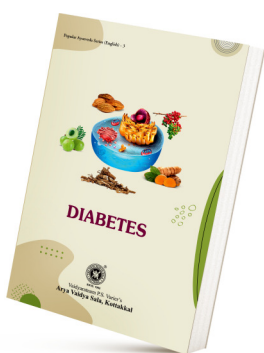
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