

## Review Article

# Efficacy of Ayurvedic remedies in type 2 diabetes: A review through works done at Gujarat Ayurved University, Jamnagar

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### ABSTRACT

Prevalence of diabetes mellitus (DM) is rapidly rising throughout the globe at an alarming rate, where India leads with largest number of diabetics and became “diabetes capital of the world.” Currently available conventional options for diabetes have certain limitations; considering which options from alternative resources are being searched to meet the need. Ayurveda, the traditional system of Indian subcontinent hold huge number of remedies that can be useful in the treatment of diabetes and associated complications. To revalidate the actual efficacy of these formulations in DM (~*Madhumeha*); many studies have been carried out at different research centers of India. The current attempt is aimed to compile such works done at two Post Graduate institutes of Gujarat Ayurved University during 2000–2013. These studies aimed at establishing the impact of various Ayurvedic treatment modalities viz. *Shodhana* (purification/cleansing procedures) and *Shamana* (pacifying medicinal treatment) etc., in DM. These therapies were found to increase quality of life, significantly effective and clinically safe as no adverse drug reactions were reported during the treatment period.

**Key words:** Ayurveda, bhasma, diabetes, *Madhumeha*, shamana, Shodhana

## INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disorder characterized by polyuria, polydipsia, weight loss, fatigue etc., sometimes associated with complications of retina, kidney, and nervous system.<sup>[1]</sup> It is one of the lifestyle disorders whose prevalence is growing rapidly throughout the world.<sup>[2]</sup> Conventional systems have developed medicines to control and treat diabetes but are unable to provide complete relief. In addition, they are associated with adverse effects.<sup>[3]</sup> Ayurveda through its armamentarium can become a potential source of hypoglycemic drugs that may be relatively safe, significantly potent with negligible side effects and can improve quality of

life (QoL).<sup>[4]</sup> WHO has also identified importance of herbal remedies in the management of diabetes.<sup>[5]</sup> Besides medicines, Ayurveda also prefers and prescribes *Shodhana* (purification/cleansing procedures), *Pathya-Apathya* (compatible diet and lifestyle), and *Yoga* in the management of diseases. Based on similarities in signs and symptoms, DM type-2 can be compared with *Madhumeha* in Ayurveda.

Considering wide range of treatment modalities available for diabetes in Ayurveda; >200 research works have been carried out at the level of MD and PhD at various Ayurvedic institutions all over India, few of them are depicted at [Figure 1]. The present attempt is to compile all available research works done on diabetes in between 2000 and 2013, and provide brief information about them.

## MATERIALS AND METHODS

Works carried out at Gujarat Ayurved University, Jamnagar at PG/PhD level under various departments during 2000–2013 were compiled and screened to assess

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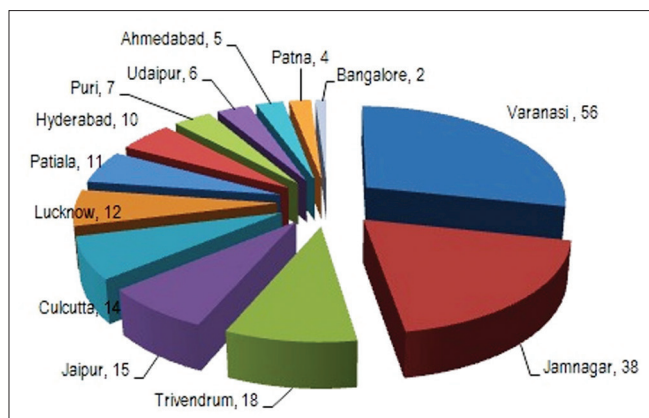
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**Figure 1:** Few researches on diabetes carried out at various Ayurvedic institutions in India

the impact of Ayurvedic treatment modalities in diabetes management.

## OBSERVATIONS

### Researches on basic etio-pathogenesis of diabetes

Studies reported that psychological stressors (*Manobhitapakara Bhavas*) have a great impact on altering defense mechanism and manifesting DM. Hence psychotherapy, counseling, antistress approaches (*Manasa Doshahara karma*) are also to be preferred besides drugs to check the vicious pathogenesis of diabetes. Relation in between psychological stressors, lipid peroxide and fasting blood sugar (FBS) was also established by the researchers.<sup>[6]</sup> A similar study ascertained definite role of stress, depression, anxiety, fear etc., psychological stressors in the etio-pathogenesis of diabetes.<sup>[7]</sup> Increased rate of catalase activity suggesting accelerated cell injury and free radical generation, which in turn is a precursor to diabetes was observed in stress induced diabetes in albino rats.<sup>[8]</sup>

### Shodhana procedures in diabetes

Comparative study on *Basti* (enema therapy) and *Shamana* therapy (pacifying medicinal treatment) was attempted earlier. *Pramehaghna Basti* for 16 days including *Niruha* and *Anuwasana Kalabasti* provided significant results on *Prabutamutrata* (polyuria), *Avilamutrata* (turbid urine), *Kshudhadhikya* (polyphagia), *Trishnadhikya* (polydipsia), *Karapadadaha* and *Suptata* (burning and numbness in palms and soles) and *Dourbalya* (weakness) in comparison to oral administration of *Pramehaghna Ghanavati* (2 g thrice daily with Luke warm water for 2 months).<sup>[9]</sup> *Virechana* (therapeutic purgation) followed by *Medohara Rasayana Vati* (1 g thrice daily) for 30 days was reported to provide satisfactory results in subjective as well as objective parameters of diabetes.<sup>[10]</sup> *Virechana* followed by *Vidangadi Ghanavati* (2–3 tablet, 500 mg each, thrice daily

with Luke warm water for 12 weeks) found to be effective than *Shamana* therapy (with *Vidangadi Ghanavati*) alone.<sup>[11]</sup>

Other similar studies with *Virechana* followed by *Nishakatakadi Yoga* (3 g, thrice daily for 30 days) reported better results in subjective as well as objective parameters than *Shamana* therapy.<sup>[12]</sup>

*Virechana* followed by *Nyogrodhadi Ghanavati* (2 tablet 500 mg each, thrice daily for 30 days) was proven to be comparatively effective than *Shamana* therapy alone.<sup>[13]</sup>

Comparative clinical efficacy of *Vamana* (therapeutic emesis) and *Virechana* was also studied. 1 g of *Guduchi Satva* (starchy extract of *Tinospora cordifolia* [Willd.] Miers) twice daily for 28 days was administered after *Vamana* and *Virechana* in two different groups. HbA1c was reduced by 8.3% after *Vamana*, while it was 3.5% after *Virechana*. FBS and postprandial blood sugar (PPBS) were also responded more with *Vamana* than *Virechana*.<sup>[14]</sup>

*Vamana* followed by *Nisha Amalaki Churna* (2 g thrice daily for 30 days) showed better relief on *Avilamutrata*, *Galatalu Shosha* (dryness of mouth), reduction in FBS, PPBS and urine sugar, while *Virechana* followed by *Nisha Amalaki Churna* showed better result on *Ati sweda* (increased perspiration), *Karapadadaha*, *Suptata* and serum cholesterol levels. Though both groups showed statistically significant improvement ( $P < 0.01$ ) on blood sugar levels and symptoms of diabetes; *Vamana* procedure showed better results against *Virechana*.<sup>[15]</sup>

### Single herbal drug therapies in diabetes

*Kuberaksha Ghana* (dried aqueous extract of *Caesalpinia bonduc* [L.] Roxb.) failed to attenuate blood sugar level, while the kernel powder shown significant ( $P < 0.001$ ) hypoglycemic activity at high doses (540 mg/kg body weight of rats). Clinically both kernel powder and *Kuberaksha Ghana* at a dose of 3 g daily for 6 weeks failed to attenuate glycemic level and diabetic symptoms.<sup>[16]</sup> *Mamajjaka Ghana* (aqueous extract of *Enicostemma littorale* auct. non Bl) exhibited weak antihyperglycaemic and no hypoglycemic activity. In clinical study, the drug was administered at a dose of 500 mg twice daily 30 min before meal for 28 days. The drug showed mild to moderate relief in FBS, PPBS levels and symptoms of diabetes.<sup>[17]</sup>

*Guduchi Ghana* was reported mild hypoglycaemic and significant antihyperglycaemic activity, while *Guduchi Satva* showed mild hypoglycaemic and insignificant antihyperglycaemic activities. Both drugs administered at a dose of 500 mg twice daily 30 min before meal for 28 days provided encouraging results (Clinical Trials Registry

India [CTRI/2012/01/002368). Highly significant relief ( $P < 0.001$ ) in all signs and symptoms were reported in both the treated groups. In FBS and PPBS, statistically significant reduction ( $P < 0.01$ ) was found in *Guduchi Ghana* in comparison to *Satva*.<sup>[18]</sup>

### Researches of polyherbal preparations in diabetes

Effect of *Medoghna Rasayana Vati* (1 g twice daily with LUKE warm water for 60 days) was reported to be effective on DM. PPBS was significantly reduced ( $P < 0.01$ ) when the drug was administered along with modern antidiabetic drug.<sup>[19]</sup> *Triphaladi Vati* and *Shilajitwadi Vati* (750 mg/day in 3 divided doses with Luke warm water for 8 weeks) provided better results with improved QoL. Blood glucose levels and diabetes symptoms were significantly improved ( $P < 0.01$ ) by *Triphaladi Vati* in comparison to *Shilajitwadi Vati*.<sup>[20]</sup>

*Triphaladi granules* (5 g twice daily before meals with Luke warm water for 2 months) along with *Pathya Palana* (dietary regulations) showed significant reduction in FBS, PPBS along with insignificant decrease in serum HbA1c level (CTRI/2011/12/002195T). Significant antihyperglycemic and mild hypoglycemic activities were reported in experimental animals.<sup>[21]</sup>

*Asanadiyoga Vati* and *Shilajitwadi Vati* at a dose of 4 g/day with water for 8 weeks provided encouraging results. *Asanadiyoga Vati* reported 68% improvement, while *Shilajitwadi Vati* 63% in all signs and symptoms.<sup>[22]</sup> *Mehamudgara Vati* (750 mg thrice daily for 3 months) along with controlled diet and exercises showed significant results.<sup>[23]</sup> *Nyagrodhadi Vati* and *Gokshuradi Guggulu* (6 g/day with water for 8 weeks) showed mild reduction in glycemic levels. Comparatively, *Nyagrodhadi Vati* reported to be effective against signs and symptoms of diabetes.<sup>[24]</sup> *Saptarangyadi Ghanavati* (1 g thrice daily with Luke warm water) showed significant reduction in FBS, PPBS and HbA1c levels. The drug exhibited significant antidiabetic effect comparable to glibenclamide in experimental studies.<sup>[25]</sup> Clinical effect of *Vatsakadi Ghanavati* and *Mamajjaka Ghanavati* (6 g/day with water for period of 10 weeks) was also evaluated. *Vatsakadi Ghanavati* showed marked and moderate relief in 20% and 30% patients on FBS and PPBS, while *Mamajjaka Ghanavati* showed 30% marked and 40% moderate relief in FBS, and 20% marked and 40% moderate relief. *Vatsakadi Ghanavati* provided better results against *Mamajjaka Ghanavati*.<sup>[26]</sup> *Saptavimshati Guggulu* (1 g twice daily for 12 weeks) and *Haridra Churna* (3 g twice daily) showed significant improvement in HbA1c%, urine albumin, polyuria and fatigue, while insignificant result in FBS and PPBS.<sup>[27]</sup>

### Bhasma (incinerated herbo-metallic preparation) therapies in diabetes

*Vanga Bhasma* (Tin calx) at a dose of 250 mg twice daily for 28 days was reported to be effective in DM. Highly significant improvement ( $P < 0.001$ ) was observed in *Prabhutnutrata*, *Avilamutrata*, *Kshudhadhikya*, *Trishnadhikya* and *Pindikoudvestana*,<sup>[28]</sup> with marginal reduction in FBS and PPBS. Weak to moderate antihyperglycemic activity was reported in streptozotacin induced diabetes in rats.<sup>[29]</sup>

*Naga Bhasma* (Lead calx) at a dose of 60 mg twice daily for 28 days provided significant relief in all signs and symptoms of DM. FBS and PPBS were reduced significantly ( $P < 0.05$ ). Moderate antihyperglycemic and no hypoglycemic action was reported in experimental animals.<sup>[30]</sup>

*Laghu Malini Vasanta Rasa* (*Yashada Bhasma* [Zinc calx] based formulation) at a dose of 250 mg twice daily for 8 weeks showed maximum relief in both subjective and objective parameters and highly significant relief ( $P < 0.01$ ) in symptoms of *Karapada Tala Daha*, *Daurbalya*, *Karapada Suptata* and significant relief ( $P < 0.05$ ) in *Prabhutamutrata* and *Pindikodweshtana* along with significant reduction in PPBS and urine sugar level (CTRI/2011/11/002111). Insignificant antihyperglycemic activity was reported in experimental animals.<sup>[31]</sup>

### Kupipakwa Rasa (herbo-metallic medicines) on diabetes

*Makaradhwaja* (Gold, Mercury and Sulphur based formulation) at a dose of 125 mg, with *Guduchi Ghana* (125 mg) and honey, twice daily for 28 days lowered FBS, PPBS and all signs and symptoms of DM significantly ( $P < 0.05$ ). Moderate to good antihyperglycemic effect was reported on streptozotacin induced diabetes in experimental animals. Diabetes induced fatty changes in renal tissue were attenuated with *Makaradhwaja*.<sup>[32]</sup>

*Triguna Makaradhwaja* (TM) (processed with 3 times of sulphur) and *Shadguna Makaradhwaja* (SM) (SBM) (processed with 6 times of sulphur) prepared with *Ashtasamskarita Parada* at a dose of 17.5 mg with *Guduchi Ghana* and honey twice daily for 28 days provided 40.38% and 67.92% moderate improvement respectively. Overall, SBM showed the better efficacy on subjective and objective parameters. SBM also showed comparatively better antidiabetic activity in streptozotacin diabetic rats.<sup>[33]</sup>

## DISCUSSION

Charaka has emphasized on *Rogam Aado Parikshyeta* that implies on thorough examination of a patient before planning treatment regimen.<sup>[34]</sup> He has also given

importance to personalized therapy under *Purusham Purusham Vikshya*,<sup>[35]</sup> which highlights that the mode of treatment varies from individual to individual. Hence, it is equally important to diagnose the patient along with diagnosis of disease.<sup>[36]</sup> Ayurveda has also given utmost importance towards quality of drug, maturity of plant, season and time of collection, standard preparation methods, and their mode of usage comprehensively.<sup>[37-40]</sup> These principles are well described by Charaka in *Kalpasthanā*, where he stressed judicious selection and use of drugs for purification procedures (*Vamana* or *Virechana*).<sup>[41]</sup>

The most common problem in diabetic patient is a general body weakness and a fast deterioration of major organs affecting all physiological systems including the mind. Ayurvedic management strategy include *Snehana* (oleation), *Shodhana* and *Shamana* treatments accompanied with suitable dietary and lifestyle modifications, which has been found very effective in controlling diabetes. Based on these clues, researches were undertaken in different institutes. As incidences of DM are high in Saurashtra region of Gujarat,<sup>[42]</sup> attempts were made to study the efficacy of Ayurvedic treatment modalities in DM at associated institutes of Gujarat Ayurved University.

Among 28 research works; 14 works are related to animal experiments, remaining were clinical studies. Different therapeutic modalities used in these studies are depicted in [Figure 2]. References of drugs used in these studies are enlisted at [Table 1].

Total 1736 patients were included in these studies based on the signs and symptoms of diabetes along with random blood glucose  $\geq 200$  mg/dl or fasting blood glucose  $\geq 126$  mg/dl or 2 h blood glucose  $\geq 200$  mg/dl, during an oral glucose tolerance test. In maximum studies, patients with uncontrolled blood sugar levels with allopathic antidiabetic drugs. In such cases, Ayurvedic drugs were administered along with allopathic drugs. Only three studies were registered at CTRI.

Studies corroborate definite role of psychological stress, lifestyle changes, lack of exercise and irregular dietary habits in raising the picture of DM.<sup>[6-8,19]</sup> Substantial evidences now exist to suggest pathogenesis and associated complications of diabetes with unhealthy diet and lifestyles choices, reduced physical activity, over eating, psychological stressors and depressive disorders.<sup>[43-45]</sup>

*Vamana* and *Virechana* are the two *Shodhana* procedures preferred in these works. *Vamana* is found to be more effective than *Virechana*, may be due to *Kapha Pradhanatva*

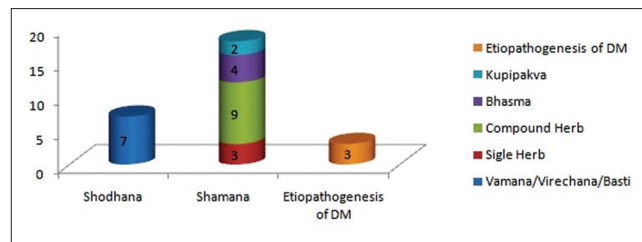


Figure 2: Various modes of therapies in different studies

Table 1: References of drugs under trials

Trial drug attempted (single herb/formulation/ Bhasma/Kupipakva Rasa)	Reference
<i>Pramehaghna Ghanavati</i>	Anubhuta*
<i>Medohara Rasayana Vati</i>	Sushruta Samhita, Chikitsa Sthana 9/6
<i>Vidangadi Ghanavati</i>	Yogratnakara, Prameha Chikitsa, verse 63, p. 529
<i>Nishakatakadi Yoga</i>	Sahasrayoga, Parishishta Prakarana Kashaya, p. 275
<i>Nyogrodhadi Ghanavati</i>	Chakradatta, Prameha Chikitsa, 35/27-31
<i>Nisha-Amalaki Churna</i>	Charaka Samhita, Chikitsa 6/26
<i>Kuberaksha</i>	Ashtanga Samgraha, Prameha Chikitsa, 14/13
<i>Mamajjaka Ghanavati</i>	Bhaishajya Samhita (published by Health Ministry Gujarat State, Ahmedabad), p. 493
<i>Guduchi Satva</i>	Nighnatu Ratnakar, 1 <sup>st</sup> ed., Part 2, p. 579
<i>Guduchi Ghana</i>	Siddha Yoga Sangraha, Jwaradhikara, p. 4
<i>Medoghna Rasayana Vati</i>	Sushruta Samhita, Chikitsa Sthana 9/6
<i>Triphaladi Vati</i>	Chakradatta, Prameha Chikitsa, 35/24
<i>Shilajitwadi Vati</i>	Rasoddhara Tantra, Prameha Chikitsa, p. 78
<i>Mehamudgara Vati</i>	Bhaishajya Ratnavali 37/69-72
<i>Nyagrodhadi Vati</i>	Chakradatta, Prameha Chikitsa, 35/27-31
<i>Gokshuradi Guggulu</i>	Sharangdhara Samhita, Madhyam Khanda, 7/84-87
<i>Saptaranyadi Ghanavati</i>	Anubhuta*
<i>Vatsakadi Ghanavati</i>	Chakradatta, Prameha Chikitsa, 35/24
<i>Saptavimshati Guggulu</i>	Bhaishajya Ratnavali, Bhagandara Adhikara, p. 609; AFI part 1, 5/11
<i>Triphaladi Kwatha granules</i>	Yoga Ratnakara, Prameha Chikitsa, verse 73, p. 531
<i>Asanadiyoga Vati</i>	Ashtanga Hridaya, Prameha Chikitsa, 12/34-35
<i>Shilajitwadi Vati</i>	Siddha Yoga Sangraha, Pramehadhikara, p. 94
<i>Vanga Bhasma</i>	Rasamritam 3/88
<i>Naga Bhasma</i>	Rasa Tarangini 19/29-33
<i>Laghu Malini Vasanta Rasa</i>	Yogaratanakata Jwaradhikara, p. 245, AFI part 1, 20/46
<i>Makaradhwaaja</i>	Bhaishajya Ratnavali, Vajikarnadhikara, verse 114-123

\*Anubhuta: Experience based formulation traditionally practiced in folklore, having no classical reference

of *Madhumeha*. But, owing to inconveniences of *Vamana Karma*, patients prefer *Virechana*. Few studies were also

conducted on *Basti Karma*. In *Shamana* therapy maximum drugs possess *Laghu-Ruksha Guna, Katu-Tikta Rasa, Ushna Virya, Katu Vipaka, Kapha-Pitta Shamaka, Pramehaghna, Mutra Sangrahniya, Kleda Shoshaka, Medohara* etc., properties, which effectively counteract the etio-pathogenesis of *Madhumeha*.

Quality of life of diabetics is an important area of concern. Improved QoL was reported after Ayurvedic management in most of the studies. This may be due to rejuvenating and antioxidant properties of Ayurvedic medicines, improvement of body physiology and metabolism by body purification procedures (*Shodhana*), holistic approach and emphasis on suitable diet and lifestyle measures for diabetes.<sup>[46-49]</sup> All Ayurvedic trial drugs were found effective in diabetes, except *Kuberaksha*, where negative results were found as it failed to attenuate the glycemic level and diabetic symptoms.

Antidiabetic efficacy of *Bhasma* and metallic preparations is well described in ancient Ayurvedic texts<sup>[50]</sup> and validated recently.<sup>[51-56]</sup> Zinc is very important in the synthesis, storage, secretion of insulin as well as in maintaining conformational integrity of insulin in the hexameric form, and thereby improves impaired metabolism.<sup>[57,58]</sup> Contrary to widespread fear of toxicity; all these *Bhasmas* are reported to be safe.<sup>[59-62]</sup> Unchanged serological and hematological reports of the patients also supports safety of these metallic formulations.

No adverse effects of Ayurvedic treatment were reported in any of these studies. Hence all studies validate the potential of Ayurvedic treatment principles in the treatment of diabetes. Though limitations were observed in these researches, the results can be considered as lead for further well stratified studies covering large population.

## CONCLUSION

In nutshell, all Ayurvedic therapies were found to be significantly effective and clinically safe as no adverse events of adverse drug reactions were reported during treatment period. It was concluded that *Shodhana Karma* followed by *Shamana* along with *Pathya Ahara* and *vihara* was found as a suitable treatment plan to manage diabetes. In *Shodhana* therapy, maximum times *Virechana* procedure was carried out, while *Vamana* was found comparatively better than other *Shodhana* procedures. In *Shamana Chikitsa*, some *Medhya Aushadha* (brain tonics) should be prescribed along with other drugs, as while treating disease pathology, it is equally important to alleviate the disease triggering factors such as emotional stress. Along with drug interventions,

emphasis must be given to promote a healthier diet and lifestyle plans among affected individuals. When used along with conventional drugs; no interactions were reported in any study. Moreover increased QoL was reported and in cases the dose of conventional drugs was reduced on tapering basis. Considering these leads; it is suggested that multi-centric trials involving scientists from different fields is the need of the hour that can evaluate probable mode of action of these drugs to give a scientific flavor to the age old science.

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