

A COMPARATIVE CLINICAL STUDY OF MESHASHRINGI (GYMNEMA SYLVESTRE) AND MAMAJJAKA (ENICOSTEMMA LITTORALE) IN THE MANAGEMENT OF MADHUMEHA (TYPE II DIABETES MELLITUS)

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Abstract

Introduction: Diabetes Mellitus, particularly Type 2 (Madhumeha), is a chronic metabolic disorder marked by elevated blood glucose levels and associated complications. This study aimed to evaluate the efficacy and safety of two Ayurvedic herbs, Meshashringi (*Gymnema sylvestre*) and Mamajjaka (*Encicostemma littorale*), in managing Madhumeha.

Materials and Methods: A total of 60 patients aged 30-60 years with uncomplicated Type 2 Diabetes were recruited from the OPD of the Institute of Post Graduate Ayurvedic Education and Research in Kolkata. Patients were divided into two groups: Group A received Meshashringi powder (3g twice daily) and Group B received Mamajjaka powder (3g twice daily) for 90 days. Fasting blood sugar (FBS), post-prandial blood sugar (PPBS), and HbA1c levels were assessed pre- and post-treatment. Symptomatic relief was measured through a scoring pattern.

Results: Group A showed a significant reduction in mean FBS from 139.26 mg/dl to 115.5 mg/dl (17.06% reduction, $p < 0.0001$) and PPBS from 265 mg/dl to 225 mg/dl (15.09% reduction, $p < 0.0001$). In Group B, FBS decreased from 151.73 mg/dl to 131.5 mg/dl (13.33% reduction, $p < 0.0001$) and PPBS from 273.2 mg/dl to 248.8 mg/dl (8.93% reduction, $p < 0.0001$). HbA1c levels in Group A improved by 3.50% ($p < 0.001$), while Group B showed a 1.80% improvement ($p = 0.05$). Symptomatic relief was greater in Group A, with notable reductions in prabhut mutrata (73.3% improvement) and atipipasa (83.3% improvement) compared to Group B.

Discussion: The study demonstrates that both Meshashringi and Mamajjaka effectively lower blood sugar levels and improve glycemic control. Meshashringi exhibited superior efficacy compared to Mamajjaka in symptom relief and laboratory parameters.

Conclusion: The findings support the traditional use of Meshashringi and Mamajjaka in managing Madhumeha, providing a foundation for further research on their long-term benefits and potential integration into contemporary diabetes management strategies.

Keywords: Meshashringi (*Gymnema Sylvestre*), Mamajjaka, (*Enicostemma Littorale*), Madhumeha, Diabetes Mellitus)

INTRODUCTION

Diabetes Mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to either inadequate production of insulin by the pancreas (Type 1) or the body's inability to effectively use the insulin it produces (Type 2). This condition leads to impaired carbohydrate, fat, and protein metabolism, resulting in long-term damage to various organs, particularly the eyes, kidneys, nerves, and blood vessels. Diabetes is classified primarily into two types: Type 1 Diabetes (insulin-dependent) and Type 2 Diabetes (non-insulin-dependent), with the latter being more common and closely linked to lifestyle factors such as obesity and physical inactivity.

Despite remarkable advancements in science and technology, modern society continues to struggle with achieving a truly healthy and fulfilling life. The pressures of urbanization, sedentary lifestyles, and a growing reliance on technology have created a wave of unnatural habits, both physical and mental. These changes have led to increased stress, anxiety, and emotional disturbances, such as anger and grief. As a result, numerous lifestyle-related diseases have emerged, with diabetes being one of the most prevalent. Poor dietary choices, lack of physical activity, and high levels of stress have made Type 2 Diabetes Mellitus (*Madhumeha*) a significant global health issue.

Diabetes Mellitus, particularly Type 2, has reached epidemic proportions in the 21st century. In the year 2000, the five countries with the highest diabetes prevalence were India (32.7 million), China (22.6 million), the United States (15.3 million), Pakistan (8.8 million), and Japan (7.1 million). The grim reality is that at least 50% of all individuals with diabetes remain undiagnosed, highlighting the critical need for effective detection and management strategies. Despite the ongoing advances in medical research, diabetes remains a pressing health issue, with recent studies indicating prevalence rates of 10-18% in urban India and an increasing incidence in rural populations as well.

The treatment of Type 2 Diabetes Mellitus has traditionally focused on lifestyle modifications, including diet control and exercise, as well as pharmacological interventions like oral hypoglycemic agents and insulin. While these approaches provide symptomatic relief, they often come with the risk of adverse effects. The growing concern over the side effects of conventional

diabetes treatments has led to an increased interest in alternative therapies that are both effective and safer for long-term use.

Ayurveda, a holistic system of medicine, offers promising solutions for the management of chronic diseases like diabetes. Ayurvedic principles emphasize the maintenance of health (*Swasthaparayanata*) alongside the treatment of disease, promoting a balance between prevention and cure. Unlike conventional treatments that may alleviate one ailment but cause new complications, Ayurvedic treatments focus on restoring systemic balance without adverse effects.¹

In this comparative clinical study, we explore the potential of two Ayurvedic herbs, *Meshashringi* (*Gymnema sylvestre*) and *Mamajjaka* (*Enicostemma littorale*), in the management of *Madhumeha* (Type 2 Diabetes Mellitus). Both herbs have been traditionally used in Ayurvedic medicine for their hypoglycemic properties. This study aims to assess their efficacy and safety, offering a potential natural solution to the modern-day challenge of diabetes management with minimal side effects.

MATERIAL AND METHOD

Selection of patient: Total Number of 60 patient were selected after history taking, clinical examination and pathological investigation from the OPD of institute of post Graduate Ayurvedic Education and Research at Shyamadas Vaidyasastra – pith 294/3/1 Acharya Prafulla Chandra road, Kolkata – 700009, for this study

Inclusion/Exclusion criteria:

1.1 Inclusion Criteria:

- ✓ Age group between 30-60 years in both sexes.
- ✓ Patients are willing to take part of study.
- ✓ Fasting blood glucose level > 126 mg/dl.
- ✓ PP blood glucose level < 300 mg/dl.
- ✓ Uncomplicated diabetes.
- ✓ Classical symptoms of diabetes.

1.2 Exclusion Criteria:

- ✓ Age group below 30-years and above 60-years in both sexes.
- ✓ Patients are unwilling to take part of study.

- ✓ PP blood glucose level above 300 mg/dl.
- ✓ Diabetes with diabetic Foot, retinopathy, Chronic kidney disease and Heart disease.
- ✓ Patients want to be take modern anti diabetic medicine at the time of research

1.3 Diagnostic Criteria:

- ✓ Subjective Criteria: From clinical sign and Symptoms per as Ayurvedic and Modern trend.
- ✓ Objective Criteria:
From laboratory investigation: Fasting and Post Prandial Blood Sugar level, HbA1C in selected cases, Urine sugar.

Informed Consent: Informed consent of all patient were taken in a informed consent form.

Study period: 18-Months, individual patients 90 days.

Sample Design: Sub therapeutic trial grouping of patient A and B containing 30 patients in each group.

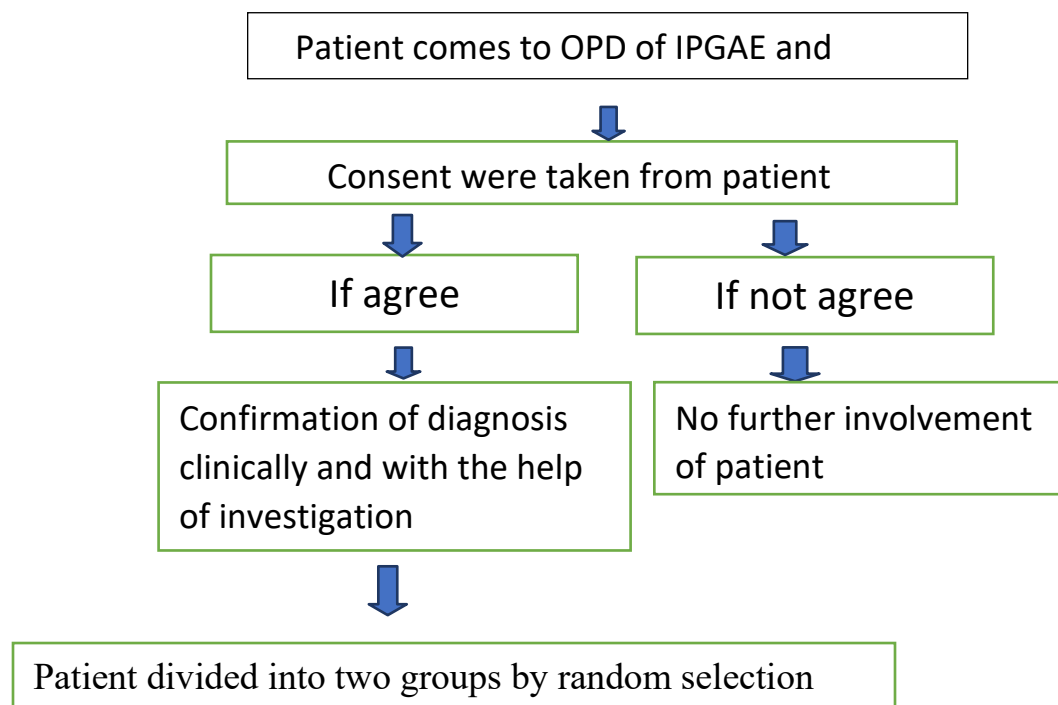
Group A: 30 Patients were treated orally with Meshashringi powder in a dose 3g twice daily before meal with water.

Group B: 30 Patients were treated orally with Mamajjaka powder in a dose 3g twice daily before meal with water.

A record of all drop out patients were recorded. Study of 90- days along with follow up on 30-days, 60-days and 90-days.

Study Design:

FLOW CHART OF STUDY DESIGN



Selection of the Drug: Selected drug Meshashringi (*Gymnema Sylvestre*) were purchased from local market and Mamajjaka (*Enicostemma littorale*) were purchased from Gujrat. and verified by the expert, then these were brought to our Apothikary (Pharmacy) department.

Preparation of drug for internal use:

The leaf of Meshashringi (*Gymnema Sylvestre*) was cleaned and dried under sunlight. The whole plant of Mamajjaka (*Enicostemma littorale*) was also cleaned and dried into sunlight. They were made into powder from our Pharmacy. Then it was preserved in airtight container and given to the patient in pollythenepacket for group 'A' and group 'B' patient.

Assessment Criteria: The patient was assess on the basis of relief of sign and symptom through the following scoring pattern

Assessment Criteria	Score	Description
1. Prabhuta Mutrata (Polyuria)		
A. Quantity	0	1.5 to 2.5 lit/day
	1	2.5 to 3.0 lit/day
	2	3.0 to 3.5 lit/day
	3	> 3.5 lit/day
B. Frequency	0	3 to 5 times/day
	1	5 to 7 times/day
	2	7 to 10 times/day
	3	10 to 12 times/day
2. Atipipasa (Polydipsia)		
	0	1.5 to 2.5 lit/day
	1	2.5 to 3.0 lit/day
	2	3.0 to 3.5 lit/day
	3	> 3.5 lit/day
3. Ati Khuda (Polyphagia)		
	0	Normal appetite
	1	Mild appetite (2 meals/day)
	2	Moderate appetite (3 meals/day)
	3	Severe appetite (4 meals/day)
4. Abil Mutrata (Turbid Urine)		
	0	Clear urine
	1	Mildly turbid

Assessment Criteria	Score	Description
5. Mutra Madhurjya	2	Moderately turbid
	3	Severely turbid
	0	Absence of glucose
	1	+ Glucose in urine
	2	++ Glucose in urine
	3	+++ Glucose in urine

Statistical analysis: All the observation made on the aforesaid criteria & were compared and grouping was analyzed statistically in terms of mean (x), standard deviation (SD), standard error (SE). The student paired (t) test were carried out and the information were interpreted in terms of label of significant (p value).

Observation

Observations on Demographic data

The majority of patients (31.66%) were in the age group of 56 to 60 years, followed by 23.33% in the 46 to 50 age group and 18.33% in the 51 to 55 age group. Males constituted 53.33% of the patients, while females made up 46.66%. The patient distribution showed 55% from the Muslim community and 45% from the Hindu community. Most patients were engaged in business (33.33%), followed by housewives (31.66%), farmers (20%), and service employees (15%). Habitat-wise distribution revealed an equal split, with 50% from urban areas and 50% from rural areas. Most patients (51.66%) belonged to the middle class, 35% were from lower socioeconomic status, and 13.33% were from upper class. A significant majority (93.33%) of patients were married, while 6.66% were unmarried. The majority of patients (38.33%) were illiterate, followed by 26.66% with higher secondary education, 15% graduates, and 13.33% with master's degrees. All patients reported *Prabhut Mutrata* and *Abil Mutrata* (100%). Other complaints included *Mutra Madhurya* (85%), *Atipipasa* (80%), and *Ati Khuda* (75%). The largest group consisted of patients with *Kapha Vata Prakriti* (53.33%), followed by *Vata Pitta* and *Kapha Pitta*, each at 23.33%. In terms of mental constitution, 60% exhibited *Tamsik Prakriti*, 35% were *Rajsik*, and 5% were *Satva Raj*. Regarding chronicity, 40% had 3 to 5 years, 25% had 1 to 2 years, 20% had 2 to 3 years, and 15% had 0 to 1 year. Family history of diabetes was present in 51.66% of patients and absent in 48.33%. Agni-wise distribution showed that most patients (51.66%) had *Mandagni*, followed by *Samagni* (30%) and *Visamagni* (18.33%). In terms of addiction, the highest percentage of patients were addicted to smoking (35%), followed by tea (31.66%), alcohol (15%), while 18.33% had no addictions. Finally, 68.33% had irregular bowel habits, while 31.66% had regular habits, with the same percentage (68.33%) reporting

constipation and 31.66% experiencing semi-solid stools. The majority of patients (63.33%) had *Krur Kostha*, 28.33% had *Madhyam Kostha*, and 8% had *Mridu Kostha*.

Observations on laboratory findings

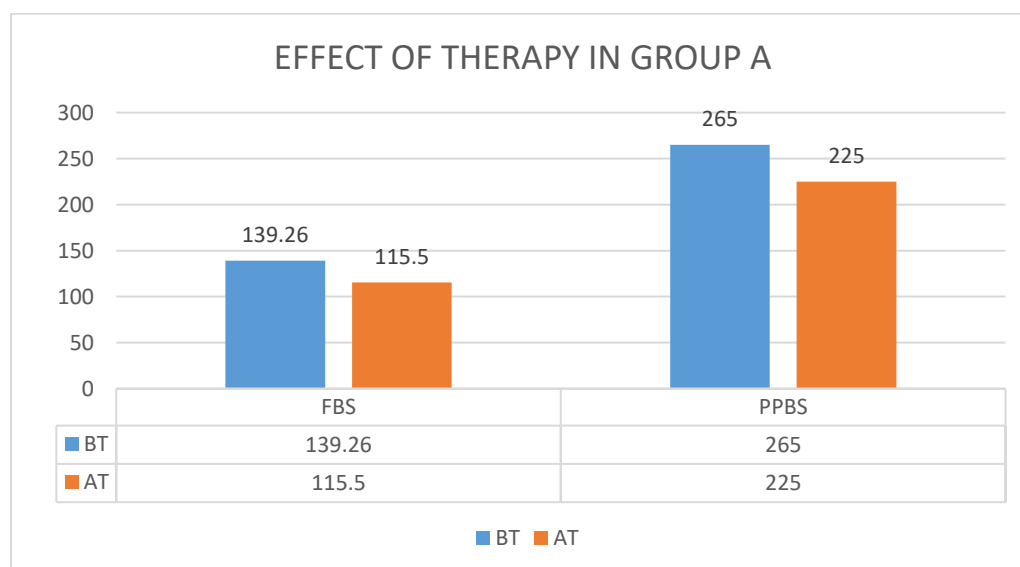
The laboratory profile of 60 patients with Madhumeha (Type 2 Diabetes Mellitus) revealed notable findings in fasting blood sugar levels. Specifically, 38.33% of patients had fasting blood sugar levels between 120-140 mg/dl, while 26.66% ranged from 141-150 mg/dl, and 35% fell within the 151-170 mg/dl category.

In terms of post-prandial blood sugar levels, 60% of patients exhibited values between 241-280 mg/dl. Additionally, 35% had post-prandial levels between 281-300 mg/dl, while only 5% were in the range of 200-240 mg/dl. These observations highlight the glycemic control challenges faced by the patients in this study.

Results:

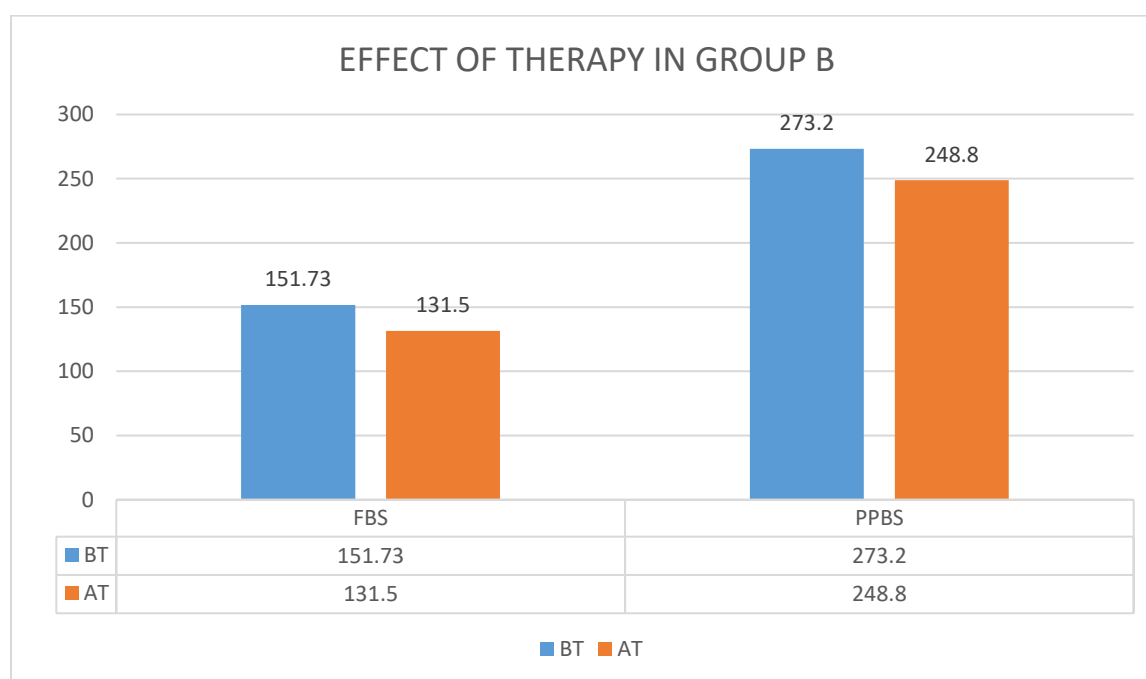
Table 1 Effect of treatment on fasting blood sugar and post prandial blood sugar level in Group 'A' patient of Madhumeha (Type 2 Diabetes Mellitus)

SN	VALUE N=30	MEAN BT	AT	% RELIEF	SD	SE	T- VALUE	P- VALUE
1	FBS	139.26	115.5	17.06 %	9.44	1.723	9.337	<0.0001
2	PPBS	265	225	15.09%	17.65	3.22	8.22	<0.0001



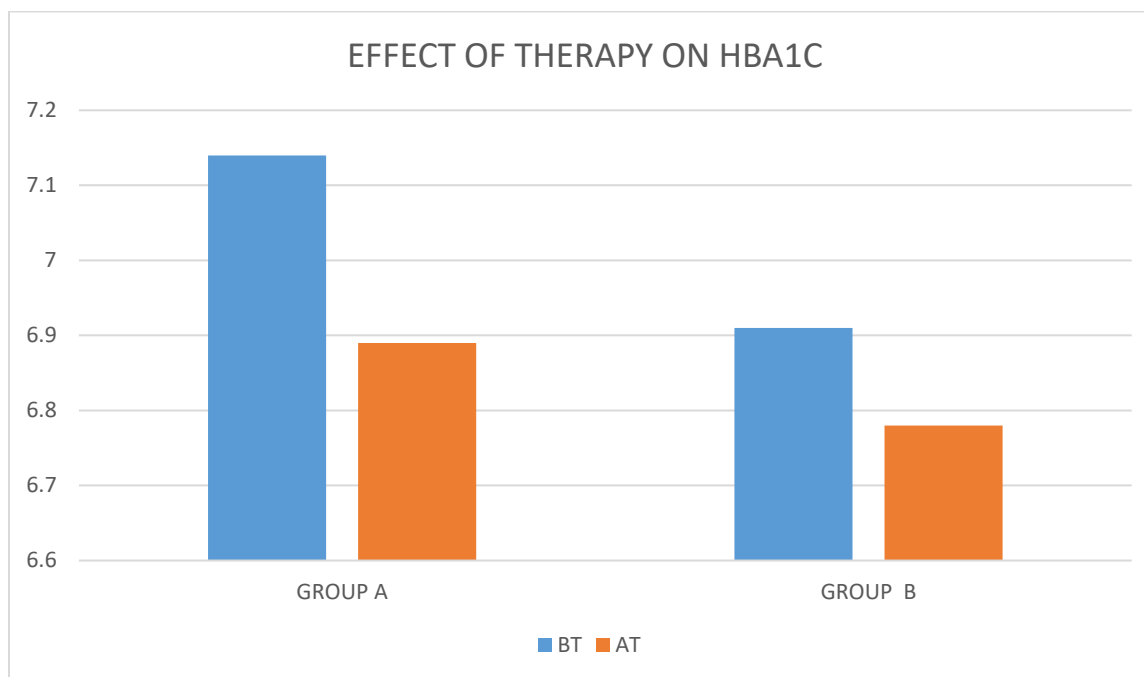
Graph 1: Effect Of Treatment In Group ‘A’ Patient Of Madhumeha(Type 2 Diabetes Mellitus)**Table2: Effect of treatment on fasting blood sugar and post prandial blood sugar level in Group ‘B’ patient of Madhumeha(Type 2 Diabetes Mellitus)**

SN	VALUE N=30	MEAN BT	AT	% RELIEF	SD	SE	T- VALUE	P- VALUE
1	FBS	151.73	131.5	13.33 %	9.35	1.723	8.238	<0.0001
2	PPBS	273.2	248.8	8.93 %	36.78	6.714	3.400	<0.0001

**Graph 2: Effect Of Treatment In Group ‘B’ Patient Of Madhumeha (Type 2 Diabetes Mellitus)****Table 3: Effect of treatment on HbA1c level in Group ‘A’ and Group ‘B’ patient of Madhumeha (Type 2 Diabetes Mellitus)**

SN	GROUP	HbA1C (MEAN)		% IMPROVEMENT	SD	SE	T-VALUE	P-VALUE
		N=20						
		BEFORE TREATMENT	AFTER TREATMENT					

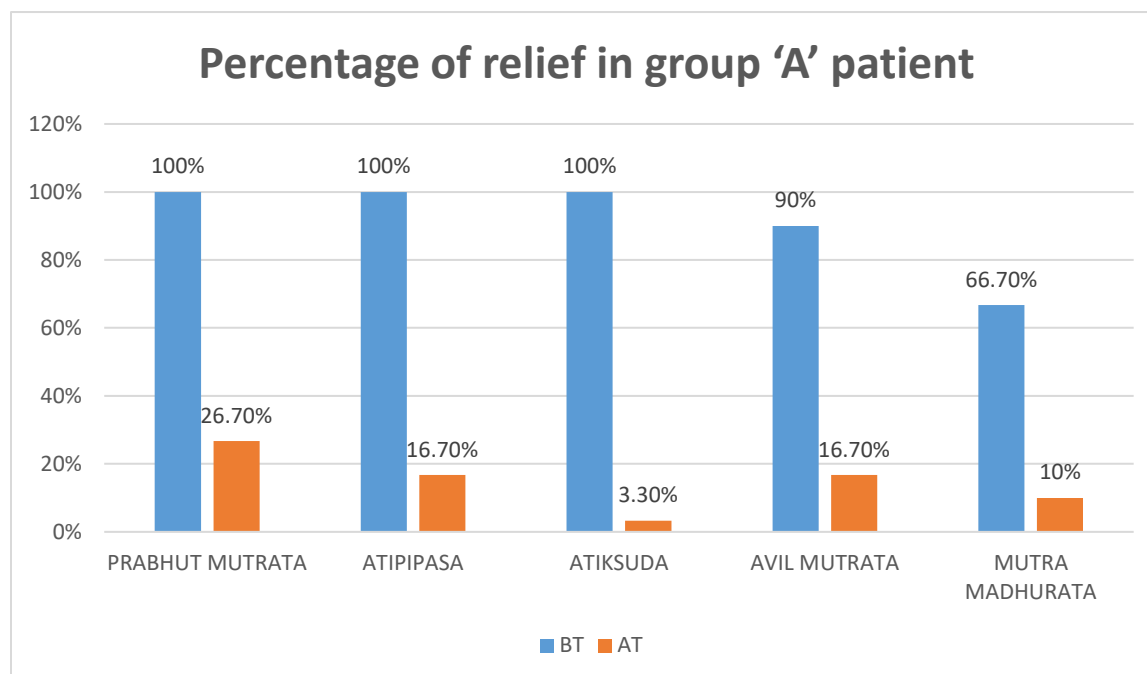
1	GROUP A	7.14	6.89	3.50%	0.3836	0.1213	10	<0.001
2	GROUP B	6.91	6.78	1.80%	0.4984	0.1576	2.23	0.05



Graph 3: Effect Of Therapy On HbA1C

Table 4: Percentage of relief of symptoms before and after treatment of group 'A' patient

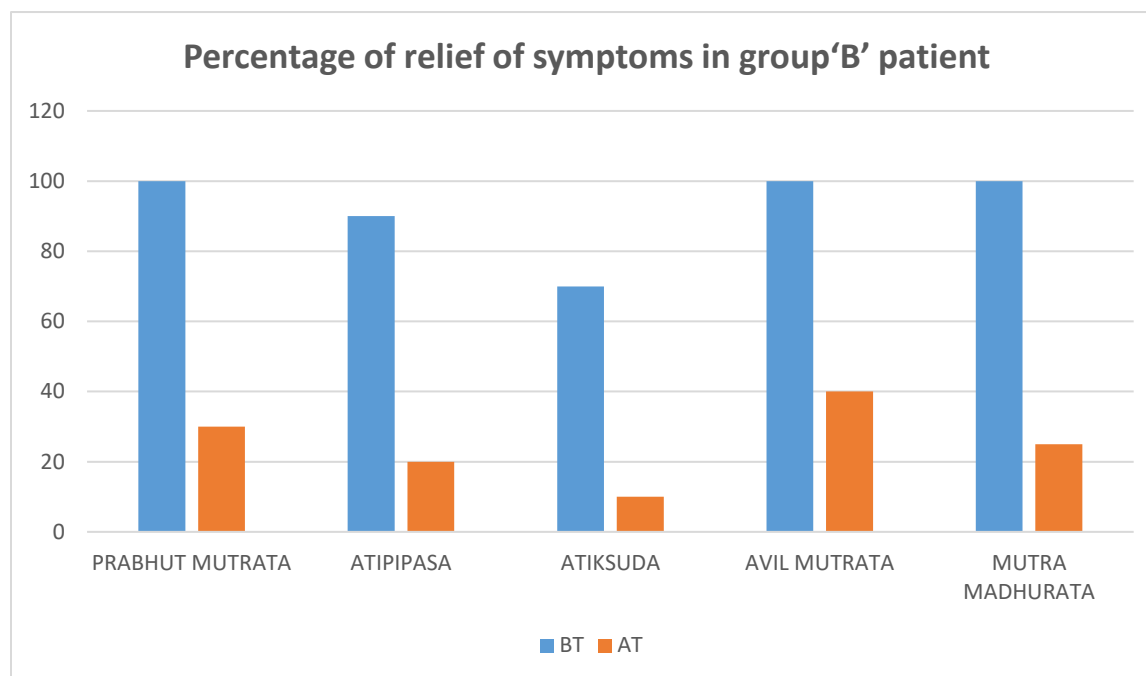
SN	SYMPTOMS	BEFORE TREATMENT (%)	AFTER TREATMENT (%)	PERCENTAGE OF IMPROVEMENT
1	PRABHUT MUTRATA	100 %	26.7 %	73.3 %
2	ATIPIPASA	100 %	16.7 %	83.3 %
3	ATIKSUDA	100 %	03.3 %	96.7 %
4	AVIL MUTRATA	90 %	16.7 %	73.3 %
5	MUTRA MADHURATA	66.7 %	10 %	56.7 %



Graph 4: Percentage of relief of symptoms before and after treatment of group 'A' patient

Table 5: Percentage of relief of symptoms before and after treatment of group 'B' patient

SN	SYMPTOMS	BEFORE TREATMENT (%)	AFTER TREATMENT (%)	PERCENTAGE OF IMPROVEMENT
1	PRABHUT MUTRATA	100	30	70
2	ATIPIPASA	90	20	70
3	ATIKSUDA	70	10	60
4	AVIL MUTRATA	100	40	60
5	MUTRA MADHURATA	100	25	75



Graph 5: Percentage of relief of symptoms before and after treatment of group 'B' patient

DISCUSSION:

The results of the study comparing the effects of treatment on fasting blood sugar (FBS), post-prandial blood sugar (PPBS), and HbA1c levels in patients with Madhumeha (Type 2 Diabetes Mellitus) from both Group A and Group B reveal significant clinical improvements, indicating the efficacy of the treatments administered.

Fasting and Post-Prandial Blood Sugar Levels

In Group A, the mean fasting blood sugar levels decreased from 139.26 mg/dl at baseline to 115.5 mg/dl post-treatment, reflecting a 17.06% reduction ($p < 0.0001$). Similarly, the post-prandial blood sugar levels decreased from 265 mg/dl to 225 mg/dl, resulting in a 15.09% reduction ($p < 0.0001$). These substantial decreases indicate that the treatment not only effectively reduced blood glucose levels but also supports the notion that interventions targeting blood sugar management can lead to significant clinical improvements in diabetic patients.

In Group B, fasting blood sugar levels decreased from 151.73 mg/dl to 131.5 mg/dl, demonstrating a 13.33% reduction ($p < 0.0001$). The post-prandial blood sugar levels also saw a decrease from 273.2 mg/dl to 248.8 mg/dl, translating to an 8.93% reduction ($p < 0.0001$). Although the reductions in blood sugar levels in Group B were less pronounced compared to

Group A, they were still statistically significant and suggest that the treatment regimen was beneficial for this group as well.

HbA1C Levels

The analysis of HbA1c levels further supports the positive impact of the treatment. In Group A, the HbA1c mean level decreased from 7.14% to 6.89%, indicating a 3.50% improvement ($p < 0.001$). In contrast, Group B showed a smaller change, with HbA1c levels decreasing from 6.91% to 6.78%, translating to a 1.80% improvement ($p = 0.05$). The more significant improvement in Group A highlights the potential effectiveness of the treatment modality employed in this group.

Symptom Relief

Symptom relief also played a crucial role in assessing treatment efficacy. In Group A, patients experienced a dramatic reduction in symptoms associated with Madhumeha. For instance, 100% of patients reported prabhut mutrata (excessive urination) before treatment, which decreased to 26.7% post-treatment, representing a 73.3% improvement. Other symptoms, such as atipipasa (excessive thirst) and avl mutrata (turbid urine), also saw substantial improvements of 83.3% and 73.3%, respectively.

In Group B, there were similar improvements in symptom relief, although the percentage of relief was slightly lower compared to Group A. For example, prabhut mutrata reduced from 100% to 30%, and atipipasa improved from 90% to 20%, both reflecting a 70% improvement.

Mode of Action of Meshashrunji (*Gymnema Sylvestre*) in the Management of Madhumeha (Type II Diabetes Mellitus)

Anti-Hyperglycemic Effect: Meshashrunji contains gymnemic acids, which are known to inhibit the absorption of glucose in the intestines.² This leads to a reduction in postprandial blood sugar levels. **Stimulation of Insulin Secretion:** *Gymnema sylvestre* has been found to stimulate the secretion of insulin from pancreatic beta cells, enhancing the body's ability to regulate blood sugar levels. **Regeneration of Beta Cells:** Studies suggest that *Gymnema sylvestre* may promote the regeneration of pancreatic beta cells, which are responsible for insulin production.³ This regeneration can improve insulin sensitivity and overall glucose metabolism. **Reduction of Sugar Cravings:** *Gymnema sylvestre* may block the sweet taste receptors on the tongue, which helps in reducing cravings for sweet foods, ultimately leading to lower sugar intake. **Enhancement of Glycogen Storage:** The herb may also enhance the conversion of glucose into glycogen in the liver, promoting better energy storage and reducing blood glucose levels.⁴

Mode of Action of Mamajjaka (*Enicostemma Littorale*) in the Management of Madhumeha (Type II Diabetes Mellitus)⁵

Blood Sugar Lowering Effect: Mamajjaka exhibits hypoglycemic properties by improving glucose utilization and lowering blood sugar levels, possibly through enhanced insulin sensitivity. Modulation of Lipid Metabolism: This herb can help in the regulation of lipid profiles by decreasing cholesterol and triglyceride levels, which is particularly beneficial in diabetes management. Antioxidant Activity: Mamajjaka contains antioxidants that help in reducing oxidative stress, which is often elevated in diabetic patients. This action may protect pancreatic beta cells from damage.⁶ Improvement of Gut Health: Mamajjaka has been shown to have a positive effect on gut health, which can indirectly influence glucose metabolism by improving the gut microbiota and enhancing nutrient absorption. Enhancement of Insulin Action: *Enicostemma littorale* may enhance the action of insulin at the cellular level, facilitating better glucose uptake by tissues and improving overall glycemic control.⁷

Conclusion:

This study has systematically explored the role of Ayurvedic interventions in the management of Madhumeha (Type II Diabetes Mellitus), focusing specifically on the therapeutic efficacy of Meshashrunji (*Gymnema Sylvestre*) and Mamajjaka (*Enicostemma Littorale*). The findings indicate that both herbs possess significant anti-hyperglycemic effects and contribute to improved glycemic control through multiple mechanisms, including the enhancement of insulin secretion, reduction of glucose absorption, and modulation of lipid metabolism.

The evidence presented in this study supports the traditional use of these herbal remedies in Ayurveda, highlighting their potential as adjunct therapies in contemporary diabetes management. Moreover, the investigation into their mode of action underscores the scientific basis for incorporating these plants into treatment regimens, offering a holistic approach to health that aligns with the principles of Ayurveda.

In addition, this research emphasizes the need for further studies to validate the findings and explore the long-term effects of these herbal therapies. As the prevalence of Type II Diabetes continues to rise globally, integrating Ayurvedic practices with modern medicine could lead to more effective and personalized treatment strategies for individuals affected by this condition.

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