

## A CLINICAL STUDY OF MADHUMEHARI GHAN VATI IN THE MANAGEMENT OF MADHUMEHA W.S.R. TO DIABETES MELLITUS

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### ABSTRACT

Diabetes is also called 'The rich man's disease'. It is common among people of all economic classes, due to increase in adaptation of sedentary life style. It has become biggest silent killer today in the world. Diabetes is a group of metabolic disease in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced. A recent World Health Organisation(W.H.O.) document states that 388 million people globally will die of non communicable disease like

Diabetes and Heart disease in the next decade. If prolonged use of oral hypoglycemic drugs there is increased risk of side effects, considering these drawbacks this study was done. **Aims and Objectives-** Present research work has been undertaken with following main objectives:

1. Despite numerous studies the exact Aetiopathogenesis of madhumeh is still partially studied and ultimately leading to no proper remedies.
2. So to know the Etiopathogenesis of madhumeha the Conceptual study (Aetiopathogenesis) of Madhumeha in relation with Diabetes Mellitus.
3. To evaluate the effect of Madhumehari ghan vati in the management of a series of patients of Madhumeha with special reference of Type-2 Diabetes Mellitus.
4. To know the effect of pathya apathya with the comparison of trial drug on randomly selected patient.
5. To know the basic ideas about disease formation and its harmless herbal drug compound for based management.

**Material and Methods:** 40 Clinically diagnosed and confirmed patients of Diabetes Mellitus were selected and randomly divided into two equal groups for the administration of trial drug. **In Group A-**20 Patients have given, *Madhumehari ghan vati* 2 tab (500mg each)

BD for 45 days, with *anupan* of *phaltrikadi kwath* with *Therapeutic life style changes*. **In Group B-** 20 Patients have given, *Madhumehari ghan vati* 2 tab (500mg each) BD with *Therapeutic life style changes* for 45 days, but here in this group the selected patients are already taking modern medicines as per their routine treatment. **Results:** Statically Significant result was observed in both groups. **Conclusion:** The conclusion is made that *Madhumehari ghan vati* with *anupan* of *Phaltrikadi kwath* are effective in management of *Madhumeha* when used with therapeutic lifestyle changes. It definitely reduce all the symptoms of *Madhumeha*. The trial drugs were effective in reducing Fasting Blood Sugar, Post Prandial Blood Sugar and Urine Sugar. it can be used safely in patients of *Madhumeha* (Diabetes Mellitus) with success.

**KEYWORDS:** Diabetes Mellitus, Insulin, sedentary life, therapeutic lifestyle changes.

## INTRODUCTION

Diabetes mellitus, or simply diabetes, is a group of metabolic disease in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced.<sup>2</sup>

In a diabetic, the body does not produce enough insulin (Insulin deficiency), or else the insulin produced in him is ineffective in its action (insulin resistance). Insulin is the hormone produced by the pancreas and it plays a major role in converting glucose to energy. Body can't understand the array of foods that we eat. It recognizes and utilizes only when the food is converted into the material that it can identify, for instance: sugars, proteins, fats, vitamins and minerals. Thus chunk of food what we eat will be digested and largely broken down into a sugar. Glucose is then absorbed into the circulating blood. Insulin secreted from pancreas helps in blood glucose entering the body cells, where it is converted into energy. In diabetic people, the entry of glucose to body cells is hindered due to insufficient amount of insulin or ineffective insulin action.

According to International Diabetes Federation's latest estimation, world prevalence of diabetes among adults (aged 20-79 years) will increase to 7.7% and 439 million adults by 2030.

The clinical trial focuses on herbal drug preparations and plants used in treatment of diabetes mellitus, a major crippling disease in the world leading to huge economic losses.

### NEED OF STUDY

It is a well-known fact that oral hypoglycemic agents used in modern medicine. Allopathic drugs don't cure the patients completely only controlling the blood sugar level but when even patient comes in contact with root cause of DM, Blood Sugar may aggravate and sudden or chronic complications will arise. It has various adverse effects like Hypoglycemia, fluid retention, interference with vitamin B 12 absorption, liver disease etc.

The proposed clinical trial is aimed to consent the DM in batter/safer way with the benefits of cost and easier oral administration way.

### AIMS AND OBJECTIVES

Present research work has been undertaken with following main objectives:

1. Despite numerous study the exact etiopathogenesis of madhumeah is still partially studied and ultimately leading to no proper remedies.
2. So to know the Etiopathogenesis of madhumeah the Conceptual study (Aetiopathogenesis) of *Madhumeah* in relation with Diabetes Mellitus.
3. To evaluate the effect of Madhumeahari ghan vati in the management of a series of patients of *Madhumeah* with special refrence of Type-2 Diabetes Mellitus.
4. To know the effect of pathya apathy with the comparision of trial drug on randomly selected patient.
5. To know the basic ideas about disease formation and its harmless herbal drug compound for based management.

### LITERARY REVIEW

The word *Prameha* is derived from “*Pra*”– means excess, *Meha* –“*Ksharne*”- passing of urine. So *Prameha* is passing excessive and turbid urine (*prabhootha avila mootrata*).

Madhumeah is a clinical entity in which patient passes large quantity of urine similar to madhu having kshaya and madhur taste, ruksha texture and honey like colour and thus body attains sweetness.

On the other hand the word “diabetes mellitus” consists of two words diabetes and mellitus. Diabetes means “excessive discharge of urine” and mellitus means “honey”. So it shows that word diabetes mellitus and *Madhumeah* have same literal meaning.

Acharya Charaka has classified the “*Pramehi*” into two types i.e.

- *Sthula Pramehi & Krisha Pramehi*
- *Santarpan janya & Aptarpan janya Prameha.*

Acharya Sushruta has classified *Madhumeha* as

- *Kulaja Madhumeha* (Hereditary) and *Apathyanimittija Madhumeha* (because of faulty life style).

Acharya Vagbhata classified *Prameha* as

- *Dhatukshaya janya Madhumeha* and *Avarana janya Madhumeha.*

### Modern Review

In modern system of medicine, Diabetes mellitus has been classified as-

1. Type - I Diabetes- [ $\beta$  -cell destruction, usually leading to absolute insulin deficiency]

A- Immune mediated

B- Idiopathic

2. Type- II Diabetes-[variable degree of insulin resistance, Impaired Insulin Secretion and increased glucose production] International Diabetes Federation data reveal that India has more diabetes than the United States. Although the prevalence of both type I & II Diabetes is increasing worldwide, the prevalence of type -2 Diabetes Mellitus is expected to rise more rapidly in future because of increasing obesity and sedentary life style.

## MATERIALS AND METHODS

### DESIGN OF STUDY

Randomized, Control, Open Clinical study.

#### 1. Selection of Cases

The study was exclusively based on clinical trials and for the study. Selection of patient was made amongst the patient attending OPD and IPD in DSRRAU irrespective age, sex, religion etc. fulfilling the criteria of selection.

#### (A) Inclusion Criteria

1. Patients having clinical features of *Madhumeha* (DM type II)
2. Patients between the age group of 18-70 years of either sex.

**(B) Exclusion Criteria**

1. Patients of *Sahaja Madhumeha* [IDDM]
2. Patient of type II DM who are on Insulin therapy
3. DM with complications.
4. Diabetes insipidus
5. Drug induced DM.
6. Age below 18 and above 70 years
7. Diabetes mellitus due to other hormonal disturbances like Pheochromocytoma, Acromegaly etc.
8. Diabetes due to side-effects of drugs: A) Diuretics (thiazide groups) B) steroid
9. FBS [ $>250\text{mg/dl}$ ]
10. PPBS [ $>350\text{mg/dl}$ ]
11. DM with coronary artery diseases
12. Uncontrolled DM

**2. Grouping & Administration of Drug**

All the selected patients were randomly divide into two group.

**Group A** - 20 Patients have given, *Madhumehari ghan vati* 2 tab (500mg each) BD for 45 days, with *anupan* of *phaltrikadi kwath* with *Therapeutic life style changes*.

**Group B**- 20 Patients have given, *Madhumehari ghan vati* 2 tab (500mg each) BD with *Therapeutic life style changes* for 45 days, but here in this group the selected patients are already taking modern medicines as per their routine treatment.

Follow up of patient was done regularly once after every 15 days i.e. on 15<sup>th</sup>, 30<sup>th</sup> and 45<sup>th</sup> day for any recurrences.

**(4) Criteria for assessment:-** The effect of trial drug was assessed in terms of Subjective & Laboratory parameters.

**Subjective assessment-** All the patients registered for clinical trial asked for any changes in their clinical manifestations.

Special symptom of *Madhumeha* (DM) which was looked in to includes-

- (1) Prabhuta Mutrata (Polyuria) Frequency of urine
- (2) Pipasa (Polydypsia) Feeling of thirst

- (3) Kshudha (Appetite)
- (4) Kara-Pada-Tala-Daha/Supti (Neuropathy)
- (5) Avila Mutrata (Turbidity)
- (6) Mutramadhurya (Glycosuria)
- (7) Dourbalyata (Weakness)
- (8) Alasya/Utsahahani (General Debility)
- (9) Shula (Joint Pain)
- (10) Pindiko-udveshatan (Cramps)

### Criteria For Assessment of Patients

#### (1) PrabhutaMutrata (Polyuria) Frequency of urine

3 – 6 times per day, rarely at night	0
6 – 9 times per day, 0 – 2 times per night	1
9 – 12 times per day, 2 – 4 times per night	2
More than 12 times per day, more than 4 times per night	3

#### (2) Pipasa (Polydypsia) Feeling of thirst

Feeling of thirst 7 – 9 times/24 hours, either/or Intake of water 5 – 7 times/24 hours with quantity 1.5 – 2.0 liter/24 hours	0
Feeling of thirst 9 - 11 times/24 hours, either/or Intake of water 7 - 9 times/24 hours with quantity 2.0 - 2.50 liter/24 hours	1
Feeling of thirst 11 – 13 times/24 hours, either/or Intake of water 9 – 11 times/24 hours with quantity 2.50 -3.00 liter/24 hours	2
Feeling of thirst >13 times/24 hours, either/or Intake of water >11 times/24 hours with quantity >3.00 liter/24 hours	3

#### (3) Kshudha (Appetite)

2 main meals + 1 breakfast	0
Feeling of hunger after 6 hours of food	1
Feeling of hunger after 4 hours of food	2
Feeling of hunger after 2 hours of food	3

#### (4) Kara-Pada-Tala-Daha/Supti (Neuropathy)

No Daha	0
Mild Kara-pada-tala-daha	1
Moderate Kara-pada-tala-daha	2
Severe Kara-pada-tala-daha	3

#### (5) Avila Mutrata (Turbidity)

Absence of albumin in urine	0
Albumin in urine +	1
Albumin in urine ++	2
Albumin in urine +++	3

**(6) Mutramadhurya (Glycosuria)**

Absence of Glucose in urine	0
Glucose in urine +	1
Glucose in urine ++	2
Glucose in urine +++	3

**(7) Dourbalyata (Weakness)**

Can do routine exercise/work	0
Can do mild exercise	1
Can do moderate exercise	2
Cannot do routine work	3

**(8) Alasya/Utsahahani (General Debility)**

No Alasya (doing satisfactory work with proper vigor and in time)	0
Normal capacity of doing work / late initiation	1
Less capacity of doing work / late initiation	2
No initiation of doing work	3

**(9) Shula (Joint Pain)**

No pain	0
Pain in joint, routine movements normal	1
Pain in joint, slight limitations of movements	2
Pain in joint, limitations of movements with reduced activity	3

**(10) Pindiko-udveshatan (Cramps)**

No cramps	0
Cramps after walking more than 1 km	1
Cramps after walking ½ km	2
Inability in walking even ½ km	3

-Assessment of sign and symptoms were done pre and post trial as follows

S.No.	Symptoms relieved	Grading	Assessment
1.	Less than 25%	Mild relief	Non- satisfactory
2.	25% to 50%	Moderate relief	Good
3.	50% to 75%	Significant relief	Satisfactory
4.	75% to 100%	Complete relief	Excellent

**(C) Objective Assessment**

Following investigations were assessed for objective assessment:-

**Laboratory Investigation**

1. Blood Sugar Parameters (i) Fasting (F.B.S.) (ii) Post Prandial (P.P.B.S.)
2. HbA1C (Optional)
3. Urine Sugar

4. LFT (if necessary)
5. RFT (if necessary)
6. Lipid profile

### 3. Selection of trial drugs

*Madhumehari ghan vati*- *Madhumehari ghan vati* was taken for the clinical trial which includes following drugs:

S.No.	Constituents	Botanical Name/ Latin name	Part Used
1	Sanaya/senna	<i>Cassia angustifolia</i>	Patra
2	Aam/Mango	<i>Mangifera indica</i>	Beej
3	Jamun/Jambul	<i>Syzygium cumini</i>	Beej
4	Nimba/Neem	<i>Azadirachta indica</i>	Beej
5	Gokshura	<i>Tribulus terrestris</i>	Mool
6	Guduchi	<i>Tinospora cordifolia</i>	Kanda
7	Haridra	<i>Curcuma longa</i>	Kanda
8	Tejapatta	<i>Cinnamomum tamala</i>	Patra
9	Manjistha	<i>Rubia cordifolia</i>	Mool
10	Black Cumin/Geerah	<i>Carum bulbocastanum</i>	Beej
11	Dry Karela	<i>Momordica charantia</i>	Phala
12	Gurmar	<i>Gymnema sylvestre</i>	Patra
13	Methi	<i>Trigonella foenum-graecum</i>	Beej
14	Bilva/Bael	<i>Aegle marmelos</i>	Patra
15	Shunthi	<i>Zingiber officinale</i>	Mool
16	Bala	<i>Sida cordifolia</i>	Beej
17	Baboolphali	<i>Acacia nilotica</i>	Phala
18	Indrayana	<i>Citrullus colocynthis</i>	Phala
19	Udumbar/Goolar	<i>Ficus racemose</i>	Phala
20	Paneer doda	<i>Withania coagulans</i>	Pushpa
21	Kalonji	<i>Nigella sativa</i>	Beej

**Method of Preparation of trial drug:-**Following process adopted for the preparation of trial drug- The Coarse powder (Yavkutta churna) form of all the drugs as described above in the table are taken in equal quantity. Now, the eight times of water is added to it and boiled on medium flam till it reduces to one fourth in the quantity. The Decoction (kwath) so formed is then filtered, continuously boiled till Ghana(semisolid form) is obtained. The Ghan is then air dried and then vati made by the help of tablet making machine. The trial drug was prepared in Pharmacy of University College of Ayurveda DSRRAU, Jodhpur.

**Mode of Administration:-Compound:-**Two Tab of 500mg each twice a day (extract), empty stomach (30 minutes before meal) for 45 days with *phaltrikadi kwath*.



**OBSERVATIONS**

The observations were made on 40 patients of *Madhumeha* (Diabetes Mellitus):

- ◆ Maximum number of patients 11(28%) were observed in both 5<sup>th</sup> decade (41-50 yrs.) & 6<sup>th</sup> (51-60 yrs.) age group. Maximum patients were Male 29 (72%) and Most of the patients were Hindus 33 (82%) and Married 37 (92%).
- ◆ Most of the patients were secondary class educated 12 (30%), Most of the patients were from urban habitat 21 (52%), Maximum No. of patients 21 (52%) were from middle class, Maximum patients i.e. 12 (30%) were having the occupation related with Businessman.
- ◆ Most of the patients were having positive family history 26 (65%), Most of the patients 22 (55%) were mixed dietary habits, Maximum no. of patients 29 (72%) were having addiction of tea/coffee.
- ◆ Most of the patient 25 (62%) have taking allopathic treatment, Most of the patients 19 (47%) were having *Mandagni*, 22 (55%) patients were *Madhyama koshta*.
- ◆ Most of the patients 19 (47%) were having *Kapha-Pittaja Sharirika Prakriti*, 20 (50%) of patients were having *Tamasika Manasika Prakriti*, 20 (50%) patients were of *Madhyama Sara.*, 24 (60%) patients were of *Madhyama Samahanana*, 20 (50%) patients were having *Madhya rasa Satmya* and 25 (62%) patients were having *Madhyama Satva*. *Madhyama Ahara Abhyavaharana Shakti* was found in 18 (45%) patients and *Avara Vyayama Shakti* was found in 19 (48%) patients.

**RESULTS**

Below Table showing Effect of therapeutic trial on clinical symptomatology in 40 patients of *Madhumeha*(Diabetes Mellitus) based on Intra Group comparison (Wilcoxon matched-pairs signed-ranks test).

S.No.	Variable	Gr	Mean		Mean Diff.	% Relief	S.D.	S.E.	P	S
			BT	AT						
1	<i>PrabhutaMutrata</i> (Frequency of Urine)	A	1.8500	0.7000	1.1500	62.16	0.9880	0.2200	0.0002	ES
		B	2.0000	0.5000	1.5000	75.00	0.8885	0.1987	<0.0001	ES
2	<i>PipasaAdhika (Polydipsia)</i>	A	1.7000	0.6500	1.0500	61.76	0.9987	0.2233	0.0004	ES
		B	2.1500	0.8000	1.3500	62.79	1.0400	0.2325	<0.0001	ES
3	<i>Kshudha</i> (Appetite)	A	2.2000	0.9000	1.3000	59.09	0.9787	0.2188	<0.0001	ES
		B	2.0500	0.7500	1.3000	63.41	1.2180	0.2724	0.0002	ES
4	<i>AvilMutrata (Turbidity in Urine)</i>	A	1.5000	0.6500	0.8500	56.67	1.0400	0.2325	0.0002	ES
		B	1.2000	0.3500	0.8500	70.83	1.1820	0.2643	0.0031	VS
5	<i>Tandra</i> (Drowsiness/ Sleepiness)	A	1.7000	0.8500	0.8500	50.00	0.9333	0.2087	0.0011	VS
		B	1.3500	0.6000	0.7500	55.56	0.7164	0.1602	0.0006	ES
6	<i>Kara-Pada-Tala-Daha/ Suptata</i>	A	1.4500	0.4500	1.0000	68.97	1.1240	0.2513	0.0008	ES

	(Numbness in hands and Feet)	B	1.4500	0.4000	1.0500	72.41	0.9445	0.2112	<0.0001	ES
7	<i>Alasya/ Utsahahani</i> (General Debility)	A	1.6500	0.9500	0.7000	42.42	0.9787	0.2188	0.0046	VS
		B	2.0500	1.1500	0.9000	43.90	1.0710	0.2395	0.0005	ES
8	<i>PandurvarnaMutrata</i> (Yellowish white urine)	A	0.8500	0.3500	0.5000	58.82	0.8885	0.1987	0.0156	S
		B	1.3000	0.4000	0.9000	69.23	1.2520	0.2800	0.0017	VS
9	<i>Pindiko-udveshatan</i> (Cramps)	A	1.6000	0.5500	1.0500	65.63	1.0990	0.2458	0.0011	VS
		B	1.9000	0.8000	1.1000	57.89	1.0210	0.2283	0.0002	ES
10	Mutramadhurya	A	1.3500	0.5000	0.8500	62.96	0.9333	0.2087	0.0002	ES
		B	1.5500	0.6500	0.9000	58.06	0.9679	0.2164	0.0006	ES

(Gr.: Group, BT: Before treatment, AT: After treatment, Diff.: Difference, SD.: Standard Deviation, SE: Standard Error, P: P value, ES: Extremely Significant, S: Significant, VR: Very Significant NS: Non Significant).

Below Table showing Effect of therapeutic trial on clinical symptomatology in 40 patients of *Madhumeha*(Diabetes Mellitus) based on INTER GROUP comparison (MANN WHITNEY TEST)

S.No.	Variable	Mann Whitney (U) Value	P Value	Signification
1	<i>Prabhuta Mutrata</i> (Frequency of Urine)	152.5	0.0792	NQS
2	<i>Pipasa Adhika (Polydipsia)</i>	169.5	0.1892	NS
3	<i>Kshudha</i> (Appetite)	195.5	0.4539	NS
4	<i>Avil Mutrata (Turbidity in Urine)</i>	198	0.4829	NS
5	<i>Tandra</i> (Drowsiness/ Sleepiness)	182	0.3026	NS
6	<i>Kara-Pada-Tala-Daha/ Suptata</i> (Numbness in hands and Feet)	198	0.4831	NS
7	<i>Alasya/ Utsahahani</i> (General Debility)	194	0.4379	NS
8	<i>Pandurvarna Mutrata</i> (Yellowish white urine)	158.5	0.11	NS
9	<i>Pindiko-udveshatan</i> (Cramps)	198.5	0.4887	NS
10	Mutramadhurya	187	0.3592	NS

Below Table showing Effect of therapeutic trial on lab parameters in 40 patients of *Madhumeha*(Diabetes Mellitus) based on intra group comparison (pair t-test).

Variable	Gr	Mean		Mean Diff.	S.D.	S.E.	P	Paired T Test	S
		BT	AT						
<i>PPBS</i>	A	228.4500	207.9500	20.5000	23.7940	5.3210	0.0005	3.853	ES
	B	194.5500	169.7000	24.8500	24.8410	5.5550	0.0001	4.474	ES
<i>FBS</i>	A	179.2100	159.8500	19.3600	21.2590	4.7540	0.0003	4.073	ES
	B	176.2000	143.1000	33.6000	32.7290	7.3180	<0.0001	4.591	ES
<i>SGOT</i>	A	26.1250	24.3850	1.7400	5.7380	1.2830	0.0955	1.356	NQS
	B	27.6500	26.1050	1.5450	4.6670	1.0430	0.0776	1.481	NQS
<i>SGPT</i>	A	35.4900	30.3350	5.1550	10.5060	2.3490	0.0204	2.194	S
	B	28.2700	26.8700	1.4000	2.8300	0.6328	0.0197	2.212	S
<i>S.Bilirubin Total</i>	A	0.7680	0.7230	0.0450	0.0902	0.0202	0.019	2.23	S
	B	0.8140	0.7815	0.0325	0.0848	0.0190	0.0514	1.714	NQS

<i>S.Bilirubin Direct</i>	A	0.3555	0.3120	0.0435	0.0813	0.0182	0.0136	2.394	S
	B	0.3065	0.2780	0.0258	0.0724	0.0162	0.0471	1.762	S
<i>Blood Urea</i>	A	25.9150	25.0450	0.8700	1.7970	0.4019	0.0217	2.165	S
	B	27.3350	27.3250	0.0100	3.4850	0.7793	0.4949	0.0128	NS
<i>Sr. Creatinine</i>	A	0.9365	0.8795	0.0570	0.1396	0.0312	0.0418	1.826	S
	B	0.8335	0.7845	0.0490	0.0842	0.0188	0.0088	2.602	VS

Below Table showing Effect of therapeutic trial on lab parameters in 40 patients of *Madhumeha*(DM) based on INTER-GROUP comparison (UNPAIRED t-TEST).

S.No.	Variable	T value	P Value	Signification
1	<i>PPBS</i>	0.5655	0.2875	NS
2	<i>FBS</i>	1.632	0.0555	NQS
3	<i>SGOT</i>	0.1179	0.4534	NS
4	<i>SGPT</i>	1.543	0.0655	NQS
5	<i>S.Bilirubin Total</i>	0.1211	0.4521	NS
6	<i>S.Bilirubin Direct</i>	0.6166	0.2706	NS
7	<i>Blood Urea</i>	0.9809	0.1664	NS
8	<i>Sr. Creatinine</i>	0.2194	0.4138	NS

- ◆ The results of therapeutic trial reveal that **patients of group-A** showed statistically **extremely significant** changes in symptoms of *Prabhoot Mutrata, Pipasa Adhika, Kshudha, Avila Mutrata, Kara-Pada-Tala-Daha/Suptata, Mutramadhurya*.
- ◆ In **patients of group B** statistically **extremely significant** changes in symptoms of *PrabhootMutrata, PipasaAdhika, Kshudha, Tandra, Kara-Pada-Tala-Daha/Suptata, Alasya/Utsahahani, Pindiko-udveshatan, Mutramadhurya*.
- ◆ In **inter-group** comparison *PrabhootMutrata, PipasaAdhika* is shows **not quit significant** results and *Kshudha, AvilaMutrata, Tandra, Kara-Pada-Tala-Daha/Suptata, Alasya/Utsahahani, PanduvarnaMutrata, Pindiko-udveshatan, Mutramadhurya* is shows **not significant** results.
- ◆ The results of therapeutic trial on lab parameters reveal that the **patients of group-A** showed statistically **Extremely Significant** changes in PPBS AND FBS. In **patients of group B** statistically **Extremely Significant** changes in PPBS and FBS.
- ◆ For **intergroup comparison UNPAIRED t- TEST** was used which revealed that **not quit significant** difference was found in FBS and SGPT.

All these findings prove that the trial drugs '*Madhumehari Ghan Vati*' show positive response on various Clinical & laboratory parameters which indicates that this drug has good Antidiabetic effect when used with anupan of phaltrikadi kwath and therapeutical lifestyle changes combined therapy.

**DISSCUSSION AND SUMMARY****Probable mode of action of Madhumehari ghan vati**

The contents of *Madhumehari ghan vati* due to their *Laghu-Ruksha* properties reduces *Kleda* in the body that in turn corrects the *Dhatushaithilya*. Most of the drugs in the formulation are having *Tikta-Kashaya* Rasa which reduces *Madhurya* in the *Rasa, Rakta* and other *Jaliya Dhatu*. In modern parlance *Madhumehari ghan vati* appears to enhance endogenous insulin, possibly by regeneration/ revitalization of the residual beta cells in insulin-dependent diabetes mellitus. Moreover, *Embllica officinalis* exhibits anti-diabetic activity on virtue of improvement in peripheral glucose utilization, increased insulin sensitivity, or anti-oxidant property. It is a well known *Rasayana* drug which might have affected the  $\beta$ -cell destruction.

Past study reveals that the active components of the contents of *Madhmehari ghan vati* has the following functions

Berberine- potent DPP4 inhibitor

Berbamine- blood glucose regulator

Palmatine- blood glucose regulator

Dehydrocheilanthifoline- insulin secretagogues

6-oxoberberine- regulates glucose homeostasis

Columbamine- insulin secretagogues

Jatrorrhizine- insulin secretagogues

Rubiadin- potentiates insulin effects due to increase peripheral utilization of glucose

Purpurin- Strong antioxidant action

Xanthopurin- strong antioxidant action

Manjistin- immune potentiating effect

Psuedopurin- immune potentiating effect

4- hydroxyl isoleucine- insulinotropic activity

Galactomannan- regulates glucose homeostasis

Alfa tocopherol- reduces level of glycosylated haemoglobin

Fenugreekine- maintains blood glucose by slowing down metabolism

Scopoletin- blood glucose regulator

Trigonelline- blood glucose regulator

Pterostillbene- exerts regranulation of pancreatic beta cells

Marsupin- insulogenic

Pterosupin- insulogenic

Myrcetin- blood glucose regulator

Isoliquirtigenin- anti hyper glyceimic

Palmatine- insulin mimicking effect

## CONCLUSION

- *Madhumehari ghan vati* with anupan of *Phaltrikadi kwath* are effective in management of *Madhumeha* when used with therapeutic lifestyle changes. It definitely reduce all the symptoms of *Madhumeha* (Diabetes Mellitus) that include *Prabhootamutrata* (Polyuria), *Pipasaadhikya* (Polydipsia), *Kshudha* (Appetite), *Avila Mutrata*, *Tandra* (Drowsiness), *Kara-Pada-Tala-Daha/ Supti* (Burning sensation/ Numbness in palm and soles), *Alasaya/ Utsahahani* (General Debility), *Panduvarna Mutra* (Yellowish-white urine), *Pindikodveshtan* (Cramps in calves), *Mutramadhurya* (Glycosuria). These improvements in symptoms is brought about by *Samprapti Vighatana* of the disease. It proves that the trial drugs posses' hypoglycemic effects.
- The trial drugs were effective in reducing Fasting Blood Sugar, Post Prandial Blood Sugar and Urine Sugar.
- It can be concluded that in current research work the proposed medicine *Madhumehari ghan vati* with anupan of *phaltrikadi kwath* exhibit significant hypoglycemic activity and shown improvement in symptoms of *Madhumeha*. it can be used safely in patients of *Madhumeha* (Diabetes Mellitus) with success.

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