A CLINICAL STUDY TO EVALUATE THE ANTIHYPERGLYCEMIC ACTIVITY OF BHANDIRA

Manjunath Prabhu¹, Pradeep²

¹PG Scholar,
²Associate Professor, Department of Dravyaguna, Shri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan-573201

Article DOI: https://doi.org/10.36713/epra7826
DOI No: 10.36713/epra7826

Corresponding Author: Manjunath Prabhu, PG Scholar, Department of Dravyaguna Shri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan-573201

ABSTRACT

Introduction: Madhumeha (Diabetes mellitus) is a lifestyle-related, multifactorial disease with multiple facets involving all the Srotas, Dhatus and the Ojas. Madhumeha is a Vataja variety of Prameha, which manifests either due to Margavarana or due to Dhatu Kshaya.

Diabetes mellitus is a clinical syndrome characterized by Hyperglycemia due to absolute or relative deficiency of insulin. Diabetes and its complication pose a major threat to future public health resources throughout the world. In this study an effort has been made to evaluate the Madhumehahara karma (Antihyperglycemic activity) of Bhandira (Clerodendrum infortunatum auct Non Linn)

Materials and methods: The present study was an open labelled, single arm, clinical study in Madhumeha (Diabetes mellitus) (n=30) selected using convenience sampling technique with pre and post design conducted in a tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India. 32 patients fulfilling the inclusion criteria suffering from Madhumeha w r to Diabetes mellitus were selected with the intervention of Bhandira patra vati 3 Twice in a day (BD) for 30 days.

Results: The effect of therapy was assessed before and after treatment, the results were statistically analyzed; it showed significant changes in subjective parameters like praboota mutrata, avila mootrata, kshudadikya, karapada daha, and Objective parameter- Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS), Fasting Urine Sugar (FUS), Post Prandial Urine Sugar (PPUS)

Conclusion: Bhandira patra vati in a dose of 3 BD before food has shown better efficacy in subjective parameters like praboota mutrata, avila mootrata, kshudadikya, karapada daha, and Objective parameter like- FBS, PPBS, FUS, PPUS

KEY WORDS: Madhumeha, Anti-hyperglycaemic, Bhandira patra vati

INTRODUCTION

Madhumeha is one among the ‘Mahagada’¹ which involves maximum number of Srotas and vitiates all most all the Dhatus and the Ojas. Kapha is the predominant Dosha and the important Dushyas are Meda and Kleda. The vitiated Kapha and Pitta obstruct the path of Vata causing its provocation which can be correlated to Santarpanajanya and Apatarpanajanya respectively.² Present study is emphasizing more on Santarpanajanya Madhumeha. The description of Madhumeha has many similarities with Diabetes mellitus in all most all the aspects; this is evident during conceptual study of the disease.
Diabetes mellitus is a metabolic disorder characterized by the presence of hyperglycaemia due to defective insulin secretion, defective insulin action or both. Type II Diabetes mellitus is the most common type accounting for almost 90% of all diabetest.3

Global prevalence of Diabetes mellitus is estimated to be around 374 million in 2017 and projected to increase to 587 million adults by 2045 equalling 8.4% of total population. It is more prevalent in low and middle income countries.4 its incidence is also increasing at an alarming rate. There were 65 million prevalent cases of diabetes in India in 2016,5 it has become utmost importance to find ways to combat this disease.

*Bhandira* is a gregarious shrub common throughout India.6 It is easily available in all seasons and cost effective. One of its common folklore uses is in *prameha*.7 Drug contains Scutellarin, Quercetin which are Flavonoids and proven as Nephro protective, anti oxidant and useful in reducing vascular inflammation.8 The drug also contains Diterpenoids such as clerodin and clerodane which are proven to reduce blood sugar level in various experimental and animal studies,9 One more anti diabetic chemical constituent found in *bhandira* is Hentriacontane which is a major chemical constituent in *Gymnema sylvestris* Hence this study has been conducted to evaluate the Antihyperglycemic activity of *Bhandira* in *Madhumeha*

**AIMS AND OBJECTIVES**

To Evaluate the Madhumehahara karma of *Bhandira patra vati* in Madhumeha

**MATERIALS AND METHODS**

**Source of data:** Patients attending the Outpatient department (OPD) of *Madhumeha* at a tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India

**Ethical Committee Approval Number – SDM/IEC/25/2019**

**Clinical Trial Registry of India – CTRI/2019/08/020941**

**CRITERIA OF EVALUATION**

**Diagnostic Criteria**

For diagnosis detailed medical history and physical examination was done according to both Ayurvedic and Modern clinical methods

**Inclusion Criteria**

1. Subjects above 30 years of either gender suffering from Type 2 Diabetes mellitus will be taken.
2. RBS above ≥ 200 mg/dL10
3. FBS ≥ 126 mg/dL.
4. PPBS level ≥180 mg/dL.
5. Those patients willing to participate in the study and who are ready to sign the informed consent form

**Exclusion Criteria**

1. Subjects with Type 2 Diabetes mellitus who are on insulin.
2. Subjects with Diabetic complications like Diabetic foot, Diabetic retinopathy, Diabetic neuropathy, Diabetic nephropathy and other secondary complications.
3. Patients with impaired Cardiac, Hepatic and Renal Functions
4. Pregnant and Lactating woman

**STUDY DESIGN**

The present study was an open labeld, single arm, clinical study in *Madhumeha* (Diabetes mellitus) (n=30) selected using convenience sampling technique with pre and post design conducted in a tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India

**LABORATORY INVESTIGATION**

Following lab investigations will be performed for the diagnosis.

1. Blood investigations: FBS, PPBS
2. Urine Investigations: FUS, PPUS

**DOSAGE AND DRUG ADMINISTRATION**

**Drug:** *Bhandira patra vati*

**Dosage:** 3 BD (Each tablet of 500 mg)

**Route of administration:** Oral

**Time of administration:** BD Before food

**Anupana:** Ushna jala

**Duration:** 30 days

**ASSESSMENT CRITERIA**

Assessment will be done on 15th and 30th day of the treatment. Assessment table is given at (Table 1)

**STATISTICAL ANALYSIS**

- Friedman’s test was applied to analyze the significance of change in Subjective parameters
• Wilcoxon signed rank test was done as post hoc with Bonferroni correction on parameters which show significance in Friedman’s test, to interpret the time of significant change.  
• Paired T test was done for analyzing the significance of objective parameters

**OBSERVATION**

In the present study total 60 subjects were screened, out of which 35 subjects were registered for the study, among them 32 subjects completed the study and 3 were dropped out.

Among 35 completed subjects maximum (n=24) were from the age group of 31-60 years and predominance of Males (n=19) over females was found. 14 subjects were from middle class group and majority of them (n=19) were having sedentary life style. Diet wise distribution showed maximum (n=29) were having non veg diet. Considerable number of subjects (n=27) were not doing vyayama (Exercise), maximum number of subjects (n=27) were having family history

**RESULTS**

In the present study total 60 subjects were screened, out of which 35 subjects were registered for the study, among them 32 subjects completed the study and 3 were dropped out.

32 subjects were administered with Bhandira patra vati in a dose of 3 BD Before food along with Ushna jala for a period of one month

Friedman’s test was run on subjective parameters and has shown significant improvement in symptoms like Praboota mootrata Day and Night, Avila mootrata, Kshudadikya, Karapada daha. Results are placed at (Table 2)

Paired t Test was run on objective parameters like FBS, PPBS, FUS and PPUS and has shown significant improvements. Results are placed at (Table 3)

**DISCUSSION**

**EFFECT OF THERAPY ON SUBJECTIVE PARAMETER**

**Effect on Praboota mutrata**

There was significant reduction in frequency of micturition day time and night time (p < 0.001), Wilcoxon signed rank test as post hoc test with Bonferroni correction 0.0166 also showed reductions in between D1 to D30 (p < 0.001).

**Praboota Mootrata** is due to increase of Shareera Kleda and due to Draveekrita Dushyas leading to reduction in Prabhoota Mootrata.

**Effect on Avila mootrata**

There was significant reduction in Avila mootrata (p < 0.001) Mean ranks also decreased significantly. Wilcoxon signed rank test as post hoc test with Bonferroni correction 0.016 showed significant reductions before and after treatment.

Avila mootrata is due to kapha dosha which results in turbid urine. Bhandira having tikta rasa, ushna veerya and Katu Vipaka helps in normalizing the urine by acting on vitiated kapha dosha which results in reduction of avila mootrata

**Effect on Kshudadikya**

There was significant reduction in Kshudadikya with (p < 0.001) Wilcoxon signed rank test as post hoc test with Bonferroni correction 0.0016 showed reductions between D1 and D30

Bhandira having tikta rasa, ushna veerya helps in normalizing the vitiated pitta dosha thereby improving the normal appetite, it also acts as deepana, pachana thereby improving Jataragni and dhatwagni thus helps in treating the excessive hunger.

**Effect on Karapada daha**

There was significant reduction in karapada daha (p <0.001). Mean ranks also decreased significantly. Wilcoxon signed rank test as post hoc test with Bonferroni correction 0.0166 also showed reduction in D1 and D30 visits.

Karapada daha is due to pitta dosha which results in burning sensation in soles and palms Bhandira having tikta rasa acts as pitta shamaka also its having teekshna guna, Ushna veerya which acts as sroto shodaka thereby helps in reducing karapada daha

**EFFECT OF THERAPY ON OBJECTIVE PARAMETER**

**Effect on FBS**

There was gradual reduction in FBS with (p < 0.001) and mean difference of 26.25 which is statistically significant.

**Effect on FUS**

There was reduction in FUS with (p < 0.001) and mean difference of 0.45 which is statistically significant.
Effect on PPBS
There was significant reduction in PPBS with \( p < 0.001 \) and mean difference of 43.88 which is statistically significant.

Effect on PPUS
There was reduction in PPUS with \( p < 0.001 \) and mean difference of 0.50 which is statistically significant.

The drug contains Scutellarin, Quercetin which are Flavonoids and proven as Nephro protective, anti oxidant and useful in reducing vascular inflammation.\(^{168}\)

The drug also contains Diterpenoids such as clerodin and clerodane which are proven to reduce blood sugar level in various experimental and animal studies.

One more anti diabetic chemical constituent found in bhandira is Henriciaconante which is a major chemical constituent in Gymnema sylvestris.

All these chemical constituents are effective in reducing the blood sugar level thereby helping in glycemic control.

Based on Probable Mode of Action of Bhandira
Bhandira possess Tikta Rasa; Laghu, Ruksha, Tikshna Guna; Ushna Veerya; and katu Vipaka. It is kaphavata shamaka; Vatahara due to ushna Veerya; Laghu, ruksha guna produces lekhana, rukshana and kaphahara effect. Hence they act as Kaphahara and Medhohara according to Samanya-Vishesha Siddhantha.

Because of its Tikta rasa and Laghu, ruksha guna it helps in correction of dhatwagni. As dhathwagni is corrected Dhatu kshaya will be prevented and helps in nourishment of all the dhatus.

Preliminary phytochemical screening showed the presence of Carbohydrate, Saponins, Tannins diterpenoids and Flavonoids which exhibited highest reduction of blood glucose level with the percentage reduction of 46.99.\(^{169}\)

The present study showed significant reduction in both subjective and objective parameters of Madhumeha. But only with medication it’s not possible to control Madhumeha which requires regular medical care along with modification in Life Style, diet and exercise. This will help in management of the disease and also to reduce complications.

Conclusion
Bhandira patra vati in a dose of 3 BD
Before food along with Ushna jala for a period of one month has shown better results in subjective parameters like Praboota mootrata Day and Night, Avila mootrata, Kshudadikya and Karapada daha and also in objective parameters like FBS, PPBS, FUS and PPUS.

Financial support and sponsorship: Nil
Conflicts of interest: There are no conflicts of interest.

References
1. Acharya JT ed, Charaka samhita of agnivesha, Chakrapani datta’s Ayurveda deepika, 5th ed Indriya 9/8, chaukhamba Sanskrit sansthan, Varanasi, 2001, pp 368
2. Acharya JT ed, Charaka samhita of agnivesha, Chakrapani datta’s Ayurveda deepika, 5th ed Chikitsa 6/15, chaukhamba Sanskrit sansthan, Varanasi, 2001, pp 380
3. Goldenberg R, Punthakee Z, Definition, classification and diagnosis of Diabetes, Pre diabetes and Metabolic syndrome. Canadian journal of Diabetes; 2013; 37. P.S8-S11 Available from www.canadianjournalofdiabetes.com , Accessed on March 2, 2019
4. Cho N H, Shaw J E, Karuranga S, Huang Y, Fernandes R, Ohlrogge A W et al. Global estimates of Diabetes prevalence for 2017 and projections for 2045. Diabetes research and clinical practice. 2018; 138: p 271-281 Available from www.elsevier.com/locate/diabetes , Accessed on March 2, 2019
5. Anonymous. The increasing burden of Diabetes and variations among the states of India: The Global burden of Disease Study 1990-2016. Lancet Glob Health. 2018; 6 p e1352-62 Available from http://dx.doi.org/10.1016/S2214-109x(18)30387-5; Accessed on March 2, 2019
6. Gupta A K, Sharma M. Reviews on Indian medicinal plants.1st edition. New Delhi: Indian Council of Medical Research; 2008: p. 98
7. Rahamatullah M, Azam M N K, Khatun Z, Seraj S, Islam F, Rahman M A et al. Medicinal plants used for treatment of Diabetes by the Marakh sect of the Garo tribe living in Mymensingh district, Bangladesh. African Journal of traditional Complementary Alternative medicine. 2012; 9(3): p. 380-85. Available from: http://dx.doi.org/10.4314/ajcam.v9i3.12, Accessed on February 28, 2019
8. Eshaifol A Omar, Antony kam, Ali alqahtani, Kong M. Li et al. Herbal medicines and neuromodulators for diabetic vascular complications: Mechanism of action and Bioactive phytochemicals Current Pharmaceutical design. 2010; 16(34) p 3786 Available from: https://www.researchgate.net/publication/233585800
9. Merrit, Andy and ley, Steven. Clerodane diterpenoids. Natural products reports.1992; 9(3):243-87 Available from –
Table: 1 Self formulated Scale for assessment of Subjective parameters

| SI NO | Assessment criteria              | 0                           | 1                           | 2                           | 3                           |
|-------|----------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1.    | Prabhuta Mutrata (polyuria)      | 3-5 timesWake up once       | 6-8 timesWake up twice      | >11 times Wake up more than twice |
|       | Frequency Day time-Night time    | 3-5 timesWake up once       | 6-8 timesWake up twice      | >11 times Wake up more than twice |
| 2.    | Avila Mutrata (Turbidity)        | Crystal clear fluid         | Faintly cloudy/smoky/hazy with slight turbidity | Turbidity clearly present but news print readable with difficulty through the tube | Turbidity clearly present & news print is not readable |
|       |                                  |                             |                             |                             |                             |
| 3.    | Kshudhadikya (polyphagia)        | Feels hunger at next Annakala only | Feels hunger for once in between the Annakala | Feels hunger twice in between Annakala | Feels hunger always |
| 4.    | Karapada Daha (burning sensation in palms and soles) | Absent | Mild burning sensation | Moderate burning sensation | Severe burning sensation |

Table: 2 Showing effect of *Bhandira patra vati* on subjective parameters by applying Friedman’s test

| Parameters | N   | Mean Rank | Chi Square($\chi^2$) | p value | Remarks |
|------------|-----|-----------|----------------------|---------|---------|
| Praboota mootrata BT | 32  | 2.70      | 49.980               | < 0.001 | Significant |
| Praboota mootrata 15th Day | 32  | 2.13      | 50.15                | < 0.001 | Significant |
| Praboota mootrata 30th Day | 32  | 1.17      | 45.648               | < 0.001 | Significant |
| Avila mootrata BT | 32  | 2.73      | 45.648               | < 0.001 | Significant |
| Avila mootrata 15th DAY | 32  | 1.95      | 45.648               | < 0.001 | Significant |
| Avila mootrata 30th DAY | 32  | 1.31      | 45.648               | < 0.001 | Significant |
| Kshudadiyka BT | 32  | 2.78      | 47.290               | < 0.001 | Significant |
| Kshudadiyka 15th DAY | 32  | 1.89      | 47.290               | < 0.001 | Significant |
| Kshudadiyka 30th DAY | 32  | 1.33      | 47.290               | < 0.001 | Significant |
| Karapada daha BT | 32  | 2.73      | 48.639               | < 0.001 | Significant |
| Karapada daha 15th DAY | 32  | 2.05      | 48.639               | < 0.001 | Significant |
| Karapada daha 30th DAY | 32  | 1.22      | 48.639               | < 0.001 | Significant |

Table: 3 Showing effect of *Bhandira patra vati* on Objective parameters by applying Paired t Test

| Parameter | Mean BT±SD | AT±SD | Mean difference | SD | SE | 't' value | 'p' value | Remark |
|-----------|------------|-------|-----------------|----|----|-----------|-----------|--------|
| FBS       | 181.40     | 155.15| 26.25           | 18.62 | 3.29 | 7.974     | 0.001    | S      |
| FUS       | 0.76       | 0.31  | 0.45            | 0.34 | 0.06 | 7.440     | 0.001    | S      |
| PPBS      | 240.84     | 196.95| 43.88           | 27.89 | 4.93 | 8.899     | 0.001    | S      |
| PPUS      | 1.48       | 0.98  | 0.50            | 0.40 | 0.07 | 7.043     | 0.001    | S      |

Available from: https://www.researchgate.net/publication/21718456_clerodane_diterpenoids
10. R Matthew, Bakris G, Blonde L, Boulton A et al. Diabetes care 2018; 41(suppl. 1): S7-S12