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Research Article

HYPOGLYCAEMIC EFFECT OF LEAF DECOCTION OF *PANASA* [*ARTOCARPUS HETEROPHYLLUS* LAM] IN TYPE II DIABETES MELLITUS- A CLINICAL STUDY

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ABSTRACT

Panasa (*Artocarpus hetrophyllus* Lam.), the well known jackfruit tree, is a tree with wide ethnomedicinal uses. It is a drug used by the traditional Ayurveda physicians of Kerala for the treatment of diabetes mellitus. Hypoglycaemic effect of leaves of *Artocarpus hetrophyllus* Lam. is experimentally proven through in vitro and in vivo studies. Estimates shows that *by* the year 2025, the number of people suffering from diabetes in the world will be 350 million, of which 70 million will be in India. As diabetic patients have to take lifelong medication the medicines chosen should be safe, cost effective and free from side effects. So it is the need of the hour to find out a safer and cost effective medicine for diabetes. The present study is on the hypoglycemic effect of leaf decoction of *Panasa (Atrocarpus hetrophyllus* Lam*.)* in type 2 diabetic patients. The clinical trial was undertaken as a before and after trial with 30 patients for a period of 30 days. The trial drug showed a highly significant effect in reducing the Fasting Blood Sugar (FBS, P<0.001), Post Prandial Blood Sugar (PPBS, P=0.001) & total cholesterol (P<0.001). Also it showed a significant role in relieving associated symptoms like Polyuria, polyphagia, Polydipsia, lassitude, joint pain, excessive sweating and dryness of mouth. This study throws light into the scope of *Artocarpus heterophyllus* Lam in future researches as it is a drug available in various parts of the world, which is cost effective and proven to be safe for diabetes mellitus.

KEYWORDS: *Panasa*, *Artocarpus heterophyllus*, Diabetes mellitus, Decoction.

INTRODUCTION

Ayurveda is a science of life which mainly focuses on the well being of individuals both in healthy and diseased condition. Medicinal plants have a promising future because there are about half million plants around the world, and most of them and their medicinal uses have not yet been explored. Diabetes is one of the prevailing lifestyle disorders which can build up to a life threatening condition. Type 2 diabetes is by far the most common type of diabetes encountered in India, accounting for more than 95% of the total. Though a lot of medicinal preparations are mentioned in Ayurveda for the effective management of diabetes, the depletion of plant sources leads to unavailability of most of the effective drugs mentioned in Ayurveda. Here comes the necessity to find out and propagate the medicinal uses of inexpensive, safe and abundant plant sources for the welfare of mankind. *Panasa (Artocarpus heterophyllus* Lam*)* is one such plant which is abundantly found in Kerala and available in most parts of the world. The hot water extract of its leaves is used by the traditional Ayurvedic medical practitioners of India and Srilanka for the effective management of Type 2 diabetes mellitus. It is the folklore medicine for diabetes in Mauritius[1]. The plant is reported to have wide ethnomedicinal uses. The plant shows hypoglycaemic[1-6], antipyretic, analgesic[7], immunomodulatory[7], antioxidant[4], hypolipidemic[6], and anti tumour activities. Also it is bestowed with the capacity to cure diarrhea, asthma, convulsions, wound, inflammations etc.

The efficacy of leaves of *Artocarpus heterophyllus* Lam in type 2 diabetes mellitus have been experimentally proven through in vitro[4] and in vivo[3-7] studies. In addition experimental studies shows that the aqueous extract of leaves of *Panasa (Artocarpus heterophyllus* Lam) has a good role in lowering blood glucose levels in normal and diabetic human subjects[6]. The toxicity studies[2,3] proved that it is safe for oral administration.

The present study was an effort to incorporate the knowledge gained from research works with that from the classical text books. In this study effort have been made to evaluate the hypoglycaemic effect of leaf decoction of *Panasa (Artocarpus heterophyllus* Lam, Family Moraceae) in type 2 diabetes mellitus.

AIMS AND OBJECTIVES

To evaluate the hypoglycaemic effect of leaf decoction of *Panasa* [*Artocarpus heterophyllus Lam*] in type II diabetes mellitus.

MATERIALS AND METHODS

Research design: This is an interventional, single blind study with before, during and after evaluation of the data in a single group of 30 patients and data was analyzed using Paired –t test, Friedmann's test and Wilkoxon's signed rank test.

Inclusion criteria

- Freshly diagnosed cases of Diabetes mellitus.

Exclusion criteria

- IDDM
- Juvenile Diabetes
- Other chronic systemic diseases-Renal diseases, Hepatic diseases, Thyroid dysfunction, Malignancy.
- Pregnant lady, lactating mothers.
- Patient below the age group of 30 years and above the age group of 70 years.

Screening/Baseline investigation

- Routine blood examinations
- Fasting plasma glucose level
- Post prandial plasma glucose level

Assessment criteria

a) Primary outcome variables

Fasting plasma glucose levels, post prandial plasma glucose levels, Polydipsia, polyurea, polyphagia, loss of weight, itching, numbness, pain, excessive sweating, burning sensation and lassitude.

b) Secondary outcome variables

Total cholesterol level.

Outcome assessment

All the clinical symptoms (polyphagia, polydipsia, polyurea, itching, numbness, pain, excessive sweating, burning sensation, weight loss, lassitude) are graded as below.

Table:1 Blood examination

FBS	Before treatment	During treatment	After treatment
PPBS	Before treatment	During treatment	After treatment
Total cholesterol	Before treatment	During treatment	After treatment

Table:2 Grading of symptoms

Grade 0	Nil
Grade 1	Mild
Grade 2	Moderate
Grade 3	Severe

Intervention schedule

Medicine - Decoction of *Panasa* leaves

Dose - 96ml 4 times per day after food

Route of administration - Oral

Duration - 30 days

Collection of drug

The fresh leaves of *Panasa (Artocarpus heterophyllus Lam)* were collected from Asramom, Kollam, and Choozhattukotta, Thiruvananthapuram, Kerala, India.

Method of preparation of decoction

Study drug was administered in the form of *Paneeya Kalpana* which is a type of decoction.[8]

The drug was washed well, dried in shade and powdered to a mesh size 350µm. 12 g of coarse powder was weighed out and sealed in polythene packets. The drug contained in one such packet (12g) was boiled in sixty four times of water (768ml) and reduced to half (384 ml). After cooling the drug was filtered and the decoction obtained was orally administered 96ml four times daily after food.

Figure:1 Leaves of *Panasa* (*Artocarpus heterophyllus* Lam)

Figure:2 Decoction of leaves of *Panasa*

Observation, Interpretation And Results

Out of the 30 patients selected maximum number of patients (46.66%) came within the age group 50-60 years and least number of patients(3.33%) came within the age group 30-40 years. Males were (56.6%) females were (43.3%) and 53.3% were having a positive family history.

Effect Of Treatment On Fasting Blood Sugar (FBS)

Table 3: Mean and standard deviation of FBS before treatment, during treatment and after treatment

Time	Mean	Standard deviation
Before treatment	172.23	49.59
During treatment	156.53	39.55
After treatment	147.33	48.33

Table 4: Data and test of significance of the effect of treatment on FBS

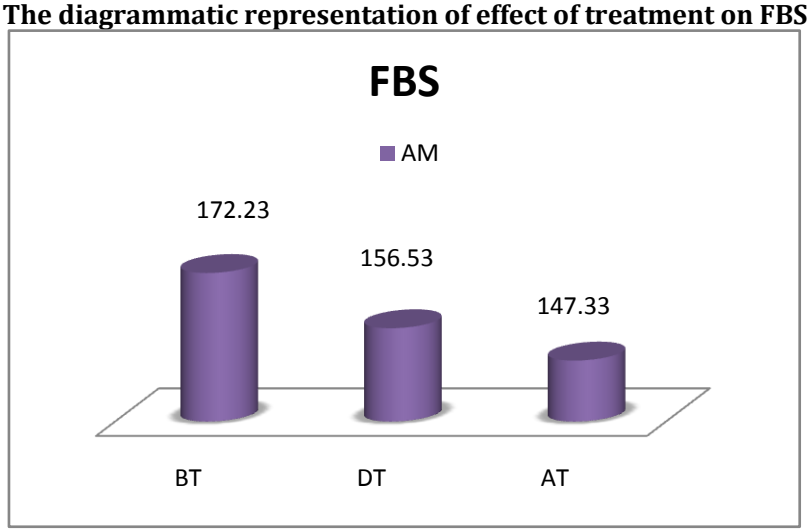
Interval	Percentage loss	t	df	P
BT-DT	9.12	3.108	29	0.004**
BT-AT	14.46	4.221	29	0.000***
DT-AT	5.8	2.500	29	0.018*

*Significant at 5% level (P<0.05)

**Significant at 1% level(P< 0.01)

***Significant at 0.1% level (P<0.001)

The diagrammatic representation of effect of treatment on FBS



As shown in the graph, the mean of FBS before treatment (BT), during treatment (DT) and after treatment(AT) were 172.23, 156.53 and 147.33 respectively. Comparison between BT and AT shows a highly significant reduction in FBS (P<0.001).

Effect of Treatment on Postprandial Blood Sugar (PPBS)

Table 5: Mean and standard deviation of PPBS before treatment, during treatment and after treatment

Time	mean	Standard deviation
Before treatment	242.03	57.83
During treatment	239.10	63.49
After treatment	201.23	77.88

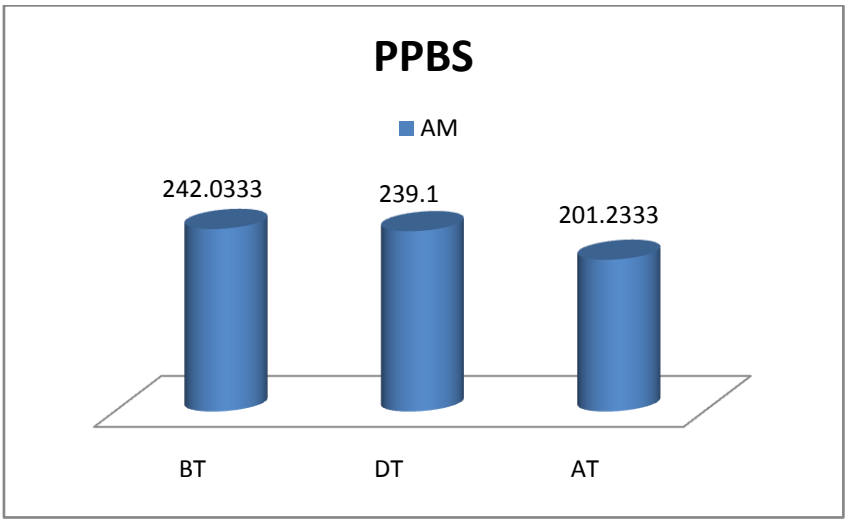
Table 6: Data and test of significance of effect of treatment on PPBS

Interval	Percentage loss	t	df	P
BT-DT	1.2	0.394	29	0.697ns
DT-AT	15.83	4.583	29	0.000***
BT-AT	16.85	3.793	29	0.001***

***Significant at 0.1% level (P<0.001)

ns Not significant (P>0.05)

The diagrammatic representation of effect of treatment on PPBS



As shown in the graph, the mean of PPBS before treatment(BT), during treatment (DT) and after treatment(AT) were 242.03, 239.10 and 201.23 respectively. Also there was a highly significant reduction while comparing the values of before treatment and after treatment (P=0.001).

Table 7: Effect of treatment on Clinical parameters

Had significant effect on	Had no significant effect on
Polyuria (P<0.05)	Loss of weight (P>0.05)
Polyphagia (P<0.01)	Numbness (P>0.05)
Polydipsia (P<0.05)	Itching (P>0.05)
Lassitude (P<0.01)	Burning sensation (P>0.05)
Joint pain (P<0.05)	
Excessive sweating (P<0.01)	

Effect of Treatment on Total Cholesterol

Table 8: Mean and standard deviation of Total cholesterol before treatment, during treatment and after treatment

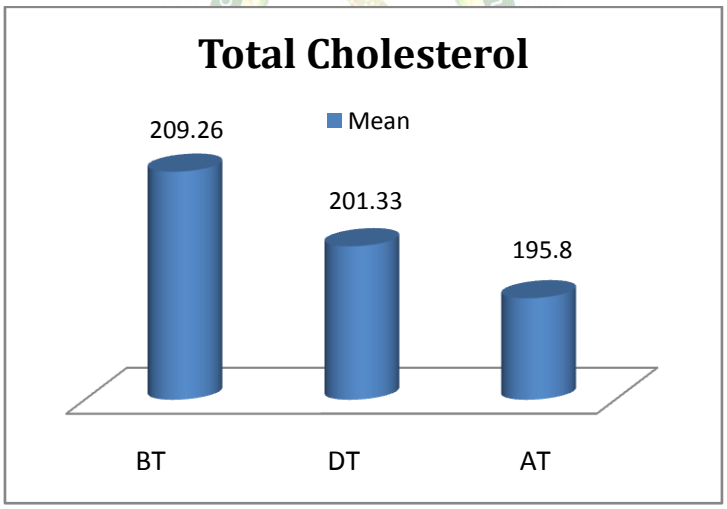
Time	mean	Standard deviation
Before treatment	209.27	26.83
During treatment	201.33	25.56
After treatment	195.8	28.81

Table:9 Data and test of significance of effect of treatment on Total Cholesterol

Interval	Interval	Interval	Interval
BT-DT	3.79	29	0.000***
DT-AT	2.74	29	0.000***
BT-AT	6.43	29	0.000***

***Highly significant (P<0.001)

The diagrammatic representation of effect of treatment on Total Cholesterol



The mean (SD) of Total cholesterol before treatment, after 15 days and after treatment were 209.27 (26.83), 201.33 (25.56) and 195.8 (28.81). There was a highly significant reduction in the total cholesterol after 15 days (DT) and after treatment (AT) with P values P< 0.001.

DISCUSSION

Research works shows that the hot water extract of this drug enhances the glucose tolerance capacity in normal subjects and diabetic patients.[5,6] And ethanol extract and n- butanol extract of *Artocarpus heterophyllus* Lam significantly reduced fasting blood glucose, elevated insulin, decreased lipid peroxides, decreased % glycosylated hemoglobin in streptozotocin (STZ)-diabetic rats.[7]

Diabetes mellitus can be compared to prameha in Ayurveda. In *Prameha Kapha*, *Medas, Kleda* and *Mootra* are mainly vitiated. *Agnimandya* will occur for both *Koshtagni* and *Dhatvagni*. There is chance of *Vata Kopa* at the end stage of *Prameha*. The drugs to be used should have the following properties- *Kaphamedohara*, *Kleda Soshana, Ama Pachana* and *Pramehaghna*. So *Katu, Tikta, Kashaya Rasa* drugs are most suitable. The *Panasa Patra Kashaya* after evaluation was found to have predominantly *Tikta* and *Kashaya Rasa*. From

literature the drug was mentioned as having *Vatahara*[9], *Jwarahara*[9] and *Vishaghna Karma*[10]. Properties of *Tikta*[11], *Kashaya Rasa*[11] like *Rooksha* and *Kledopasoshana* reduces *Kleda*. *Deepana*, *Pachana* property corrects *Agnimandya*. *Thrishna Prasamana* reduces excessive thirst, *Moothro-pasoshana* reduces frequency of micturition. *Medopasoshana* property breaks the *Samprapti* by reducing the *Medas*. *Samsamana* & *Vishaghna* property reduces *Tridosha* vitiation. *Ropana* property helps in healing of *Prameha Pidaka*. *Jwarahara* property may correct *Agnimandya* and *Pitta* vitiation. *Vatahara* property may prevent *Prameha* from becoming incurable.

CONCLUSION

Leaf decoction of *Panasa* (*Artocarpus heterophyllus* Lam) was found to be effective in lowering the FBS, PPBS and total cholesterol. The drug was found to be effective in reducing the clinical parameters like Polyuria, polyphagia, polydipsia, lassitude, joint pain, excessive sweating and dryness of mouth. The treatment had no significant effect on loss of weight, numbness, itching and burning sensation. No adverse effects were observed during the study period.

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