

RANDOMIZED CLINICAL TRIAL OF FICUS RELIGIOSA ON BLOOD SUGAR LEVEL IN TYPE II DIABETES MELLITUS - A PILOT STUDY

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ABSTRACT

Type II Diabetes is a growing health problem. The prevalence of the disease set to rise dramatically in rural as well as urban societies. Diabetes Mellitus is known to Indians from *Vedic* period onwards by the name *Asrava*(*Prameha*). Diabetes is also known as *Madhumeha* in *Ayurveda*.

There is a wide variety of plants used to cure diabetes more efficiently. Presently, herbal remedies are preferred due to less or no side effects for many diseases. *Ficus religiosa* is one of the herbs described in *samhitas*.

The study was carried out in Mahatma Gandhi Ayurved college, hospital & Research centre, Salod(H), Wardha. Total 30 patients of NIDDM were randomly taken from that 20 could complete the study. The aqueous extract of bark of *Ficus religiosa* was administered by oral route for continuous one month. The result indicated its beneficial effects on fasting & post meal blood sugar levels. The drug was well tolerated in the dosage used.

Key words – *prameha*, *Madhumeha*, *Ficus Religiosa*, NIDDM

INTRODUCTION

Despite advances in understanding the etiopatho-genesis of noninsulin-dependent diabetes mellitus (NIDDM), there is an alarming increase in the number of insulin-resistant cases and failure of oral hypoglycemic agents (OHAs). There has been an explosive global increase in the number of people diagnosed with NIDDM worldwide in the past two decades. In India, an estimated 19.4 million individuals are affected by NIDDM, and is likely to go up to 57.2 million by the year 2025. Today, India leads the world with the largest number of diabetics in any given country. In the 1970, the prevalence of diabetes

among urban Indians was reported to be 2.1%, which has now risen to 12.1%. Also, there is an equally large pool of individuals with impaired glucose tolerance (IGT), many of whom will eventually develop NIDDM in the coming future.¹

Diabetes can affect almost every physiological system of the body. It is associated with long-term dysfunction, damage and failure of various organs (such as eyes, kidneys, nerves, heart and blood vessels). Individuals with undiagnosed NIDDM are also at higher risk for cardiovascular diseases, coronary artery diseases and peripheral vascular diseases as compared with

no diabetics. These individuals also have a greater likelihood of having dyslipidemia, hypertension and obesity. Early diagnosis and control of NIDDM is important in order to reduce the risk of later complications, such as cardiovascular events, visual loss, renal failure and limb amputations.² Various herbs have also been found beneficial in the management of NIDDM and are gaining considerable recognition worldwide.³ The analysis of available data indicates that the use of herbs has increased during the past several years.^{4,5}

Many traditional plants of diabetes has received scientific scrutiny & the WHO has recommended that this area warrants attention. (Ref. – WHO expert committee in diabetes mellitus, second report (1980), technical report series 646; WHO; Geneva; 61)

Recently global attention has been focused towards the utilization of herbal remedies for prevention & management of various risk factors for diabetes. The role of the plant based medicine has been recently emphasized by WHO.

Ethno pharmacological survey indicate that more than 1200 plants are used in traditional medicine for their alleged hypoglycemic activity,

Many medicines for *prameha* are described in *samhitas*. Some herbal combination drugs are also available.

Ficus religiosa, commonly known as *peepal* in India, belongs to family Moraceae. *Ficus religiosa* has been reported to be used in the traditional system of *Ayurveda* for the treatment of diabetes (5). Decoction prepared from the bark is used in treatment of diabetes (6)



Antidiabetic studies carried out on *Ficus religiosa*⁷

S.no	Part	Type of extract	Animal model	Effective dose	Reference standard	Reference
1	Root bark	Aqueous	a) effect on blood glucose level of Normal fasted male albino rabbits	2.5 gm/kg p.o.	Tolbutamide 0.5 gm/kg; p.o	Brahmachari & Agasti (1962)
			b) OGTT using male albino rabbits			
2	Bark	β -sitosteryl-glucoside Isolated	a) effect on blood glucose level of Normal fasted male albino	5, 7.5mg/kg I.V.& 25	Tolbutamide 25 mg/kg; p.o.	Ambika & Rao 1967

		From Ethanolic extr.	Rabbits of either sex	mg/kg		
3	Leaves	Alcoholic	a) effect on blood glucose level of normal fasted male albino Wistar rats	100,200,400 mg/kg;p.o.	TNA	Deshmukh et al(2007)
			b) OGTT using male albino Wistar rats			
			c) Alloxen-induced diabetes in albino Wistar rats			
4	Bark	Aqueous	STZ-induced type 2 diabetes in wistar rats of either sex	100&200mg/kg;p.o.	Gliclazide 10mg/kg p.o.	Kirana et al (2009)
5	Bark	Aqueous	a) effect on blood glucose level of normal fasted male albino wistar rats	25,50 &100mg/kg p.o.	Glibenclamide 10mg/kg p.o.	Pandit et. al. (2010)
			b) OGTT using male albino wistar rats			
			C) STZ-induced diabetes in male albino wistar rats			

OGTT-oral glucose tolerance test,

STZ- streptozocin, TNA- text not available

Above all animal studies observed significant antidiabetic activity of aqueous extract of Ficus Religiosa bark.

Safety of drug – The long history of traditional use, with no reports of any side effects suggest that Ficus Religiosa can be considered as safe.

In majority of toxicity studies carried out on Ficus Religiosa, no signs of toxicity observed. The aqueous extract of bark of it was found to be safe up to 2000mg/kg; p.o. dose in acute toxicity studies carried out using OECD guidelines on Swiss female albino mice. (Pandit et al. , 2010)

With getting above references of antidiabetic efficacy and safety, it was chosen for the study.

Objective –

- evaluate antidiabetic effect of Ficus religiosa in type II Diabetes mellitus.

Materials and Methods – It was hospital based study. The patients attending in Mahatma Gandhi Ayurved Hospital were randomly selected. The study was approved by the Institutional Ethics Committee (IEC).

Study design –

1. The newly diagnosed Type II Diabetes Mellitus patients were randomly selected as per inclusion criteria.
2. Written informed consent was taken before the study.
3. Thorough clinical examination was done to rule out any other illness or complications of diabetes
4. Baseline fasting & postmeal blood sugar was done.

Route of administration - The aqueous extract of bark of Ficus religiosa was admi-

nistered by oral route because it was safer, more convenient, non-invasive & cheaper. Dosage – Aqueous extract 500mg twice a day before meals with water.

(Ref. For dose calculation – Toxicity studies- from Paget GE& Barnes JM(1964), : pharmacometric eds. Lawrence.D.R.& Bacharach AL volume 1)

Treatment period – The medicine was given for continuous one month.

The market preparation of the trial drug was not available. So it was procured from GMP certified Unijules life sciences Ltd, Nagpur.

Sample size – Total 30 patients were randomly selected for study. Out of that, 20 could complete the study.

Selection & withdrawal of subjects –

Subject inclusion criteria –

- Patient willing to give written informed consent.
- Age group between 30 to 70 yrs.
- Recently diagnosed patients who was not on any treatment
- Patient whose FBG is > 126 mg/ dl or 2 hrs PMBG> 200 mg/dl

Subject exclusion criteria –

- Patient less than 30 yrs. Or more than 70 yrs. Of age.
- Patient whose FBG is > 200 mg/ dl or 2 hrs PMBG> 350 mg/dl
- Malignant hypertension

- Known case of Myocardial Infarction
 - Type II D.M. with other complications
 - Patients who were already on antidiabetic drugs.
 - Pregnant or lactating women
- Withdrawal criteria –
- If FBG level increased > 200 mg/dl or 2 hrs PMBG> 350 mg/dl despite treatment.
 - If patient wished to discontinue.
 - If any serious complications developed that require urgent treatment.
 - If patient diagnosed to have some major illness during study.
 - Patients with serious recurrent illness during study.

It was informed to patients that if he or she has symptoms like sweating, drowsiness, nausea, confusion, incoordination, he or she should immediately take sugar, glucose/ biscuit & report to the doctor.

Assessment criteria – blood sugar level, fasting and post meal were assessed at baseline and at 30th day. The follow up of patients was taken on 15th day.

Statistical analysis –

All the values were expressed as Mean ± SD. Statistical analysis was done by using Student's *t*-test. The minimum level of significance was fixed at *P* < 0.05.

Results / observations –

Table No. 1:

		Mean ± SD	t Statistic	P Value
Fasting	Before Treatment	150.25 ± 19.32	3.125	0.006
	After Treatment	130.70 ± 24.43		

Figure 1:

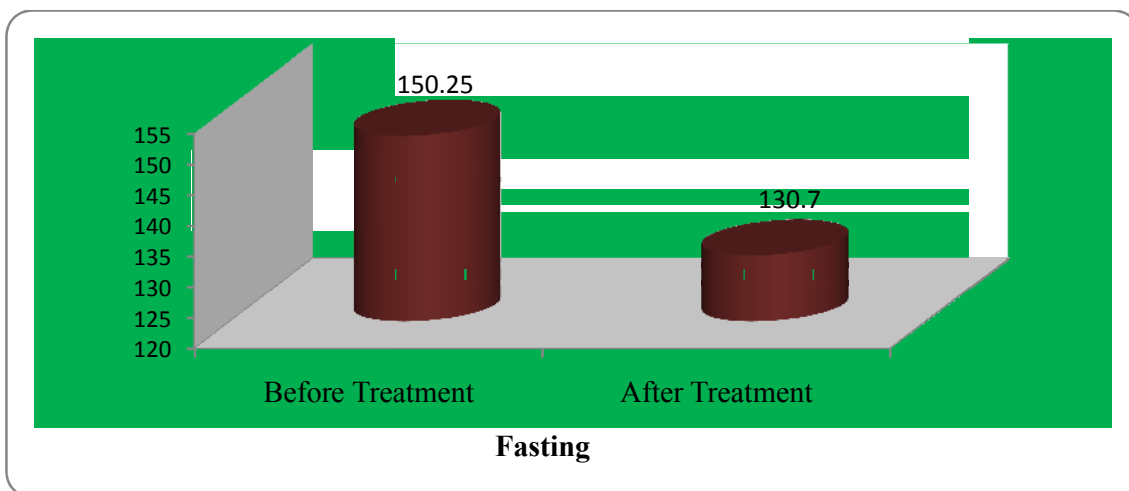
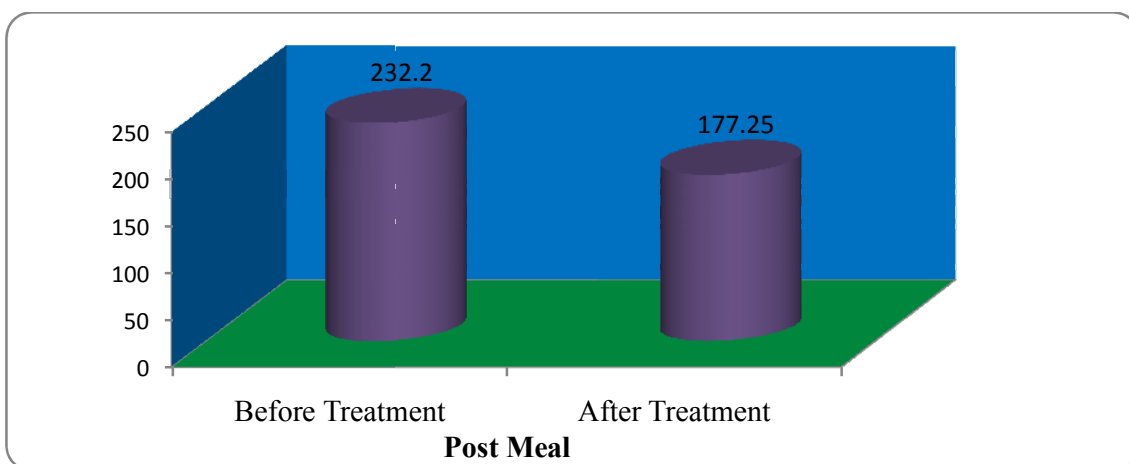


Table No. 2

		Mean ± SD	t Statistic	P Value
Post Meal	Before Treatment	232.20 ± 31.65	4.449	0.001
	After Treatment	177.25 ± 49.16		

Figure 2:



Adverse effects

The drug was well tolerated by all subjects throughout the treatment period. There was no evidence of adverse side-effects.

DISCUSSION

The present study was aimed to assess the efficacy of Ficus religiosa on blood sugar levels in NIDDM. Various animal studies were conducted for its antidiabetic, anxi

olytic as well as antioxidant effect. In one study, analysis for various elements in the Ficus religiosa showed that K, Ca, Cr, Mn, Fe, Cu and Zn were present which are responsible for initiating insulin function.(8) In another study, aqueous extract of it showed anxiolytic effect.(9) Extensive clinical and experimental studies have shown that the dietary fiber influences the lipid level of the blood and tissues to dif-

ferent extent, depending on their nature and quantity.(10) The stem-bark of Ficus religiosa had shown its ameliorative effect against hyperlipidemia associated with diabetes mellitus (11) Oxidative stress is one of the major etiologies in the pathogenesis and complications of type 2 diabetes. Ficus religiosa has been reported to modulate the enzymes of antioxidant defence system to combat oxidative stress. Restoration of glutathione and inhibition of malondialdehyde content had shown the antioxidative property of Ficus religiosa [12].

CONCLUSION

On the basis of the result obtained in this study, it is concluded that aqueous extract of bark of Ficus Religiosa may be effective in reducing fasting & post meal blood sugar levels in NIDDM. During literature search, it was found that Ficus religiosa has also antioxidant, hypolipidemic as well as anxiolytic properties which are contributing factors for causation & complication of diabetes mellitus. More studies are needed to prove these clinical efficacies and reveal the exact mechanism of action. The outcome of the future research in the above mentioned areas will provide a convincing support for the clinical use of Ficus religiosa.

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