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# Evaluation of Antidiabetic Activity of *Butea monosperma* Preparation on Streptozotocin Induced Diabetes in Rats.

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## Abstract
The preliminary phytochemical screening was carried out on the distilled of root bark and seeds of the leaves of *Butea Monosperma*. The distilled was investigated for the antidiabetic activity. The study gives effect of *Butea Monosperma* distilled (500mg/kg) on STZ induced diabetic rats which were compare with the standard drug Glibenclamide. The blood glucose levels were estimated by using GOD–POD method along with histopathological estimation. Antidiabetic activity of root and seed distilled of *Butea Monosperma* studied.

## Key Words
Antidiabetic, Diabetes mellitus, *Butea Monosperma*.

## Introduction
Diabetes mellitus is a clinical syndrome characterized by inappropriate hyperglycemia caused by a relative or absolute deficiency of insulin or by a resistance to the action of insulin at the cellular level. (Satoskar et al; 2005). It is the most common endocrine disorder. Diabetes is a leading cause of death in the world. It is a disease in which the body does not produce or properly use insulin necessary for the body to metabolize glucose (sugar). The glucose stays in blood instead and its level then gets too high, causing diabetes. Diabetes affects a large population in the world including India and it is growing phenomenally. (Wadkar et al; 2008, Karigar et al; 2009). Major problem with diabetes is the need of lifelong dependence on medication. All synthetic drugs and purified natural molecules/ingredients cause imbalances and overloads on the body systems leading to side effects and residual impact on metabolic system. (DiPiro et al; 2008). The side effect and cost of Allopathic medicine have forced health care practitioners to switch over to alternative therapies like Ayurveda, Homeopathy. Herbal drugs play a role in the diseases; most of them speed up the natural healing process. Numerous medicinal plants and their formulations are used for various disorders in ethno medical practices as well as traditional systems of medicines in India. (Wadkar et al; 2008).
*Butea monosperma* Lam is a wild crop and grows in most parts of India as a tree. *Butea monosperma;* family–Fabacea Synonym: *Butea frondosa* Common names include Palash, Dhak, Palah, Flame of the Forest, Bastard Teak, Parrot Tree.It is reputed in systems of medicines as the various parts of the plant *Butea monosperma* has been used traditionally for many of the diseases like anti-inflammatory, antimicrobial, anthelmintic, antidiabetic, diuretic, analgesic, antitumor, anticancer, astringent etc. The leaves and seeds are useful in hemorrhage, astringent, diuretic and have anti-implantation and anti-ovulatory properties. Flowers have aphrodisiac and tonic properties. Bark are used in tumors, bleeding piles, ulcers and have inhibitory action against *E.coli* and *Micrococcus pyrogens*. Roots are used to cure night blindness. (Deore et al; 2009).

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## Materials and Methods
**Plant Material:** Root bark and seeds of *Butea monosperma.*

**Animals**
Male Albino Wistar rats (180–230 g) were used throughout the experiment. They were housed under standard environmental conditions with free access to pelleted food and water.

**Preparation of Plant Distillation**
The roots bark and dried seeds of plant *Butea monosperma* were distilled by distill water (200 ml) under distillation process.

**Streptozotocin Induced Diabetes in Rats**
Study was carried out according to OECD guidelines and the ethical clearance has been obtained by the Institutional Animal Ethics Committee and Committee for the Purpose of Control and

Supervision of Experiments on Animals (CPCSEA) dated before performing the experiment.

**Induction of Diabetes in Rats**

Rats were made diabetic by a single i.p. injection of Streptozotocin at a dose of 60 mg/kg. Streptozotocin was first weighed individually for each animal according to the body weight and solubilized with 0.01 M citrate buffer, pH 4.5, immediately before use. Then 48 hrs. Later blood samples were collected by retro orbital puncture method and glucose levels were determined by using glucose estimation kit (GOD-POD Method) to confirm the development of diabetes. Rats with serum glucose levels of >200 mg/dl were included in the study. (Arambewela et al; 2005; Sudnkovich et al; 2007).

**Experimental Design of Study**

The study was carried out for 14 days to access the effect of various treatments on glucose content of pancreatic tissues both in normal and diabetic rats. The animals were weighed and marked for identification before the start of the experiment. (Mostofa et al; 2009) The rats were divided into 4 groups, consisting five animals each:

Group I: Normal control rats
Group II: diabetic control rats
Streptozotocin (60 mg/kg i.p.)
Group III: diabetic rats with test drug
preparation. (500mg/kg p.o.)
Group IV: diabetic rats with standard
drug Glibenclamide (0.6mg/kg p.o.)

**Administration of Test Samples**

The test drug preparations were administered for 14 days orally to the rats of respective groups by using oral feeding tube. The quantity of drug administered to each animal was calculated daily from its body weight.

**Administration of Standard Drug Samples**

Glibenclamide administered orally at dose of 0.6mg/kg p.o. using sterile oral feeding needle (Karigar et al; 2009). The quantity of drug administered to each animal was calculated daily from its body weight.

**Collection of Blood Samples and Determination of Blood Glucose**

The blood glucose levels were determined by glucose estimation kit before and after induction of diabetic. The blood was collected after 7th day of administration of test drug and at the end of experiments day on $14^{th}$ day. Animals were anaesthetized with ether and blood was collected by retro orbital puncture method. Serum was separated by using centrifuge machine at 3000 rpm for 15 min and stored at 4 - 8˚ C until use. The blood collected after $7^{th}$ day of test drug administration and $14^{th}$ day the glucose levels were estimated by GOD – POD method.

**Histopathological Study**

Pancreas slices fixed for 12 hrs in Bovins solution were processed for paraffin embedding following standard micro technique. 5µ section of the pancreas grained with alum haematoxylin and eosin were observed microscopically for histopathological changes i.e. normal pancreas, damaged pancreas, and recovered pancreas were studied and compared.

**Statistical Analysis**

All the results were expressed as mean ± SEM. (n=5) The Statistical significance between means was analyzed using one-way analysis of variance (ANOVA) followed by Dunnet's multiple comparison post-test using Graph Pad software. *P-values < 0.05* were considered significant.

## Results and Discussion

The plant subjected to preliminary phytochemical screening by applying different qualitative testes for phytoconstituents. The preparation showed presence of steroids, carbohydrates, phenolics, flavonoids, alkaloids, amino acids and volatile oil. Our results were in agreement of previous reported results. Table showed the blood glucose levels of Normal control, diabetic control, *Butea monosperma* preparation and glibenclamide-treated rats. In diabetic control rats, the increased in blood glucose concentration was observed after inducing of STZ. The blood glucose levels of *Butea monosperma* preparation and glibenclamide treated rats showed significant decreased in blood glucose levels after $7^{th}$ day of treatment. After, compilations of 14 day treatment the *Butea monosperma* preparation give more significant decreased in blood glucose level. Results obtained from table polyherbal preparations indicate that *Butea monosperma* preparation showed moresignificant ($p<0.01$) antidiabetic activity (233.89±7.98mg/dL) in 7 days as well as 14 days treatment (138.25±13.71mg/dL) compared to diabetic control in 7 days (281.34±25.05 mg/dL) and in prolonged treatment (338.04±33.81 mg/dL) respectively. The results were compared with standard drug glibenclamide showed antidiabetic

activity in7th days (215.76±6.60 mg/dL) and in 14 days treatment (153.90±17.10 mg/dL) and were nearly comparable with standard drug glibenclamide.

**Histopathological Study**

The histopathological result showed that: The STZ-induced diabetic (B) showed higher degree of pathological changes which includes necrosis of islets, hemorrhages and cellular infiltration. No. of islets were 0-1 per high power field. The preparation group *Butea monosperma* (C) showed no. of islets were 2-3 which gives comparatively same recovery as glibenclamide (D) group. The normal control (A) showed architecture and did not show any pathological abnormalities. The size of islets maximum in compared with other group.

## Conclusion

The distillation of *Butea monosperma* gives significantly decrease blood glucose level in test drug ($p<0.01$) compare to std. glibenclamide. The decrease glucose observed due to presence of steroids, carbohydrates, phenolics, flavonoids, alkaloids, amino acids and volatile oil. It can be concluded that *Butea monosperma* preparation may be used with the existing synthetic formulation which are present in market.

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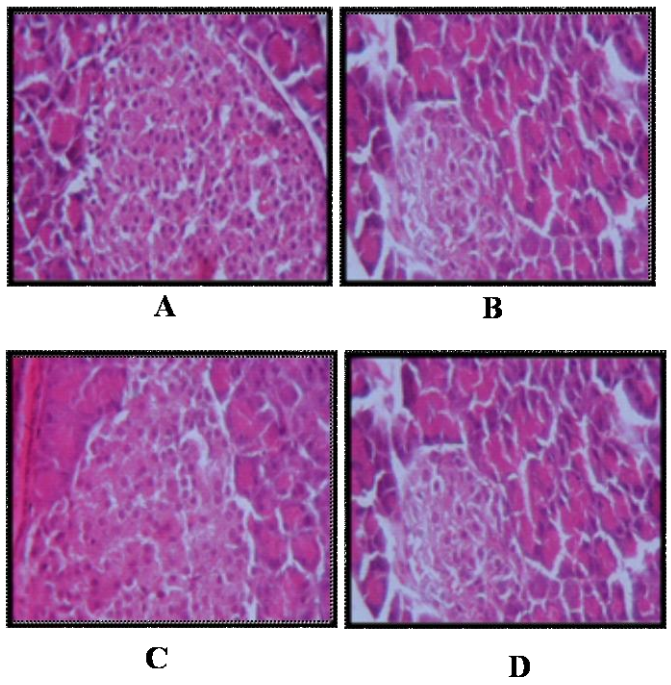


Photomicrographs rat pancreas stained by haematoxylin and eosin of normal (A) and STZ-induced diabetic (B) rats and effects of Butea monosperma preparation (C), glibenclamide (D).

**Fig. 1:** Streptozotocin Induced Diabetic Rats

**Table 1:** Effect of *Butea monosperma* preparation on blood glucose level of Streptozotocin induced diabetic rats.

| **Groups** | **Treatment (mg/kg) p.o.** | **Blood glucose (mg/dL)** | | |
|---|---|---|---|---|
| | | **Pre-Treatment Day 0** | **Post- Treatment** | |
| | | | **Day 7** | **Day 14** |
| I | Normal control | 136.55±5.5 | 131.59±3.54 | 128.93±3.44 |
| II | Diabetic control | 278.09± 24.14 | 281.34±25.05 | 338.04±33.81 |
| III | Test drug preparation (500mg) | 238.51±8.58ns | 233.89±7.98* | 138.25±13.71** |
| IV | Glibenclamide (0.6mg) | 219.88 ±8.21 | 215.76±6.60** | 153.90±17.10*** |

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