

SPERMICIDAL ACTIVITY IN AQUEOUS EXTRACT OF BUTEA

MONOSPERMA (L.) IN MALE ALBINO RATS

Rajeshwari Saraswat^{1*}, Raghunath Pokharkar² & Surendra Saraswat³

**^{1&2} Department of Chemistry, S.N.Arts, D.J.M.Commerce & B.N.S.Science College,
Sangamner-422605**

³ Department of Chemical Engineering., M.Tech. IIT, Kharagpur.

Corresponding author: Dr.Rajeshwari Saraswat

**^{1*} Department of Chemistry, S.N.Arts, D.J.M.Commerce & B.N.S.Science College,
Sangamner, Dist-Ahmednagar, 422605, (MH) India.**

Tel:91 09371092684, E-mail: rajeshwariksaraswat@gmail.com

Summary

The present study was conducted to evaluate the spermicidal activity of aqueous extract of seed powder of *Butea monosperma* in male albino rats. The aqueous extract of seed powder of *Butea monosperma* have shown some changes in Serum glutamic oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT), Alkaline phosphatase (Alk.PO₄), Serum total protein (TP) in group 1 (aqueous –control), 2 (1g / kg bw), 3 (2g / kg bw) and 4 (3g / kg bw).

Key words: *Butea monosperma*, spermicidal activity, liver function enzymes.

Introduction

Traditional medicine refers to the ancient medical practice that existed in human societies before the application of modern science to health. India is rich in medicinal plant diversity. All known types of agroclimatic, ecologic and edaphic conditions are met within India. Contraception includes the work of Cooper and Yeung¹, according to these biochemists, targeting a specific sperm protein acquired in the testes but depleted in the epididymis by toxicant that induces rapid infertility may also lead to the discovery of new contraceptives. These will require developing new organs-specific delivery of contraceptive drugs² invented novel proteins and peptides derived from proteins unique to sperm and testes. These are useful in vaccines for contraception in mammals. These proteins and peptides are also useful in diagnostic assays for assessing infertility. Howett

and Reider³ observed that broad-spectrum microbicidal and spermicidal composition containing anionic surfactants are used for preventing pregnancy and sexually transmitted diseases. In conclusion the aqueous extract of *Butea monosperma* can show good spermicidal activity with some changes in liver function enzymes.

Materials and Methods

Plant material

The plant material used in this study is collected from Western Ghats of Maharashtra and authenticated from Department of Botanical Survey of India, Pune (India).

Preparation of the extracts

The seeds of herbal drug are collected from forest area. Then the seeds were dried, powdered for the preparation of drug. The seed powder was mixed with distilled water and shake well. In this way we prepared the aqueous extract of the seed powder of *Butea monosperma*. These drugs are stored in airtight bottles. We prepared the fresh extracts.

Animals

Albino rats (Male sex) of Sprague dawley strain weighing between 240-260 Gms. The animals were acclimatized to laboratory conditions and given pelleted animal feed (Amrut feed) and drinking water. Diagnostic reagent kits were used for the estimation of liver function enzymes⁴.

Toxicity studies

The acute toxicity study was performed for aqueous extract according to the acute toxic classic method as per guidelines⁵; male rats were used for acute toxicity study. In animals the extract was administered orally at the dose of 1gm, 2gm and 3 gm / kg body weight. If mortality was observed in 2 out of 3 animals, than the dose administered was assumed as toxic dose. If the mortality was assumed in only 1 animal than the same dose was repeated again to confirm the toxic dose if mortality was not observed the procedure was repeated for further high dose.

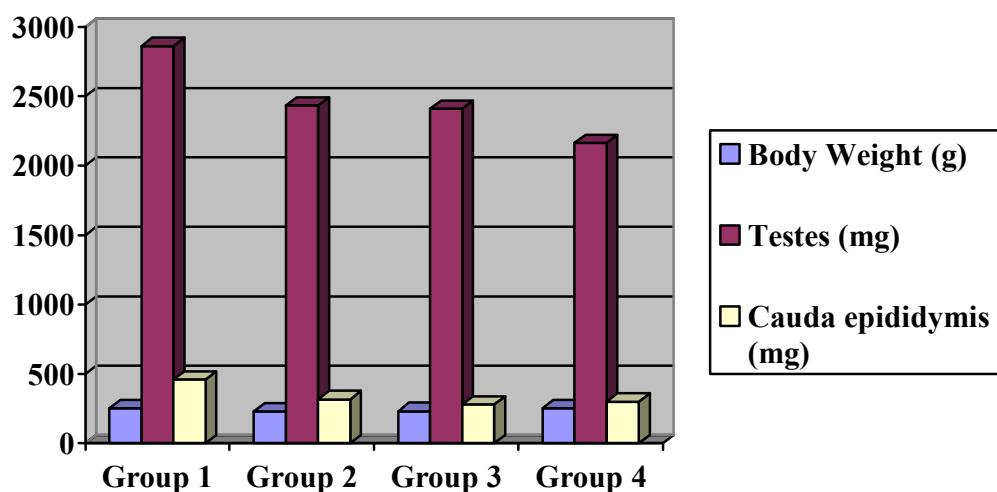
Spermicidal activity

The animals were divided in to four groups comprising of six animals in each group using randomization technique and treated with the aqueous extract of *Butea monosperma* for 45 days to assess the spermicidal activity. The first group (vehicle control) received vehicle for all the days. The second group received 1gm/kg body weight aqueous extract of *Butea monosperma*. The third and fourth group received 2gm/kg, 3gm/kg body weight aqueous extract of *Butea monosperma* simultaneously for 45 days. The blood samples were collected by cardiac puncture in heparinized microfuge tubes. The blood samples thus collected were immediately centrifuged. When serum clearly separated out, the serum was analyzed. The result thus obtained was subjected to statistical analysis using student t-test and analysis of variance.

Table 1- Comparison of mean body weight, mean absolute weight of testes, cauda-epididymis, mean serum testosterone level and mean sperm count in group 1 (aqueous –control), 2 (1g / kg bw), 3 (2g / kg bw) and 4 (3g / kg bw) - *Butea monosperma* -

| Groups | Group 1 | Group 2 | Group 3 | Group 4 |
|--------------------------|----------------|----------------|----------------|----------------|
| Variables | (X ± S.D.) | (X ± S.D.) | (X ± S.D.) | (X ± S.D.) |
| Body Weight (gm.) | 251.83 ± 7.38 | 229.33 ± 3.26 | 233.33 ± 3.93 | 254.00 ± 5.93 |
| Testes (mg.) | 2862.16 ± 9.34 | 2431.00 ± 8.17 | 2408.66 ± 8.54 | 2164.16 ± 8.97 |
| Cauda epididymis (mg.) | 460.00 ± 6.81 | 319.00 ± 6.81 | 280 ± 8.57 | 300 ± 6.19 |
| Testosterone (ng./ml) | 2.20 ± 0.04 | 1.83 ± 0.11 | 1.09 ± 0.05 | 0.84 ± 0.09 |
| Sperm count (million/ml) | 90.00 ± 5.21 | 25.50 ± 2.34 | 18.0 ± 2.82 | 10.83 ± 3.71 |

Values are mean ± SD of six rats in each group.

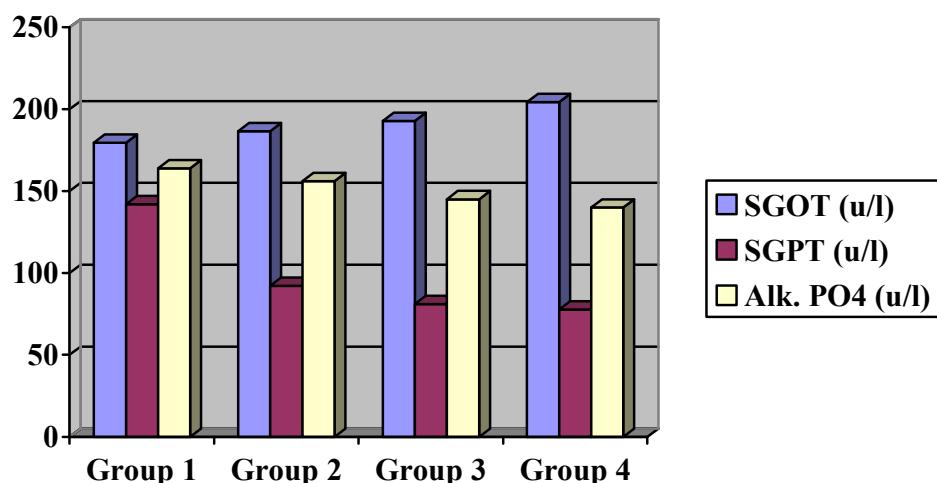


Graph No.1 - Histogram showing the changes in Body weight, Testes and Cauda-epididymis weight changes of group 1,2,3,4- following treatment with aqueous extract of *Butea monosperma*.

Table 2-Values of Liver function enzymes - Serum glutamic oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT), Alkaline phosphatase (Alk.PO₄), Serum total protein (TP) in group 1 (aqueous-control), 2 (1g / kg bw), 3(2g / kg bw) and 4 (3g / kg bw)- *Butea monosperma*

| Groups | Group 1 | Group 2 | Group 3 | Group 4 |
|----------------------------|---------------|---------------|---------------|---------------|
| Variables | (X ± S.D.) | (X ± S.D.) | (X ± S.D.) | (X ± S.D.) |
| SGOT (u/l) | 179.5 ± 7.79 | 186.66 ± 4.54 | 192.83 ± 5.67 | 204.33 ± 3.44 |
| SGPT (u/l) | 142.0 ± 3.74 | 92.16 ± 4.57 | 81.00 ± 3.74 | 77.66 ± 4.92 |
| Alk. PO ₄ (u/l) | 163.83 ± 4.91 | 156.00 ± 3.79 | 145.00 ± 3.74 | 140.00 ± 2.82 |
| TP (g/dl) | 8.25 ± 0.26 | 7.46 ± 0.31 | 7.60 ± 0.47 | 7.90 ± 0.23 |

Values are mean ± SD of six rats in each group.



Graph No. 2- Histogram showing the changes in SGOT, SGPT and Alk. PO₄ values of group 1, 2, 3, 4- following treatment with aqueous extract of *Butea monosperma*.

Result and discussion

The different parameters which are given in tables are discussed in the following points-

Body weight (g)-

The body weight in control group 1 (aqueous) was 251.83 ± 7.38 . For the aqueous extract the values were 229.33 ± 3.26 , 233.33 ± 3.93 , 254.00 ± 5.93 for 1g, 2g, and 3g / kg body weight respectively.

It means that by the treatment of aqueous extract of *Butea monosperma* the body weight decreases in 1g and 2g / kg body weight dose, but it slightly increases in 3 g / kg body weight dose.

Weight of Testes (mg)-

The weight of testes in control group 1 (aqueous) was 2862.16 ± 9.34 . The weights of testes in aqueous extract treated rats were 2431.00 ± 8.17 , 2408.66 ± 8.54 , 2164.16 ± 8.97 for 1g, 2g, and 3g / kg body weight respectively. In higher dose group, it decreases more. It means, in 3g / kg body weight dose, the testes weight decreases more, means this dose group will be also more effective.

Weight of Cauda-epididymis (mg)

The weight of cauda epididymis in animals treated with aqueous extract of *Butea monosperma* were 319.00 ± 6.81 , 280.00 ± 8.57 , 300.00 ± 6.19 for 1g, 2g, and 3g / kg body weight respectively. These values also decreases from the normal values 460.00 ± 6.81 of control group of aqueous extract treated rats.

Testosterone (ng. / ml.) Level

The testosterone value in animals treated with aqueous extract of *Butea monosperma* were 1.83 ± 0.11 , 1.09 ± 0.05 , 0.84 ± 0.09 for 1g, 2g, and 3g / kg body weight respectively. It means that the *Butea monosperma* also got spermicidal activity. In the case of aqueous extract the testosterone level decreases with dose for 1g it decrease to 1.83 ± 0.11 , for 2g 1.09 ± 0.05 and for 3 g it is 0.84 ± 0.09 from 2.20 ± 0.04 in control (aqueous) group .

Sperm count (million / ml.)

The sperm count value in animals treated with aqueous extract the value were 25.50 ± 2.34 , 18.00 ± 2.82 , 10.83 ± 3.71 for 1g, 2g, and 3g / kg body weight respectively.

It means that the *Butea monosperma* has got spermicidal activity as In the case of aqueous extract the sperm count decreases with dose for 1g it decreases to 25.50 ± 2.34 , for 2g 18.00 ± 2.82 and for 3g it was 10.83 ± 3.71 from 90.00 ± 5.21 in control (aqueous) group.

This shows that the *Butea monosperma*, aqueous extract have got considerable spermicidal activity.

Liver function enzymes

Antifertility drugs are known to cause a variety of perturbations in the isoenzymology of male reproductive organs. Many plant based drugs are known to be not only cytotoxic but also cytostatic ⁴and causes spermatogenic effect. Protein synthesis may be hampered due to antitranslational effect of these test drugs. Serum glutamate oxaloacetate transaminase and serum glutamate of pyruvate transaminase activity are known toxicity markers in the study of hepatotoxicity of chemicals.

SGOT (u/l)-Serum glutamate oxaloacetate transaminase (aspartate aminotransferase)

The mean value for SGOT count in aqueous extract treated rats were 186.66 ± 4.54 , 192.83 ± 5.67 , 204.33 ± 3.44 for 1g, 2g, 3g/kg body weight respectively. In higher dose group, it increases more. It means, in 3g / kg body weight dose, the SGOT count increases more from the normal value which is 179.5 ± 7.79

SGPT (u/l)-Serum glutamate of pyruvate transaminase (alanin aminotransferences0

The mean value for SGPT count in aqueous extract treated rats were 92.16 ± 4.57 , 81.00 ± 3.74 , 77.66 ± 4.92 for 1g, 2g, 3g/kg body weight respectively. In higher dose group, it decreases more than the normal value of 142.0 ± 3.74 it means, in 3g/kg body weight dose, the SGPT count decreases more.

Alk.PO₄ (u / l)-Alkaline phosphatase

The mean value for Alk.PO₄ count in aqueous extract treated rats are 156.00 ± 3.79 , 145.00 ± 3.74 , 140.00 ± 2.82 for 1g, 2g, 3g / kg body weight respectively., it decreases from the normal value of 163.83 ± 4.9 .

Total protein (g/dl)

The mean value for total protein in aqueous extract treated rats were 7.46 ± 0.31 , 7.60 ± 0.47 , 7.90 ± 0.23 for 1g, 2g, 3g / kg body weight respectively. The mean value for total protein in normal control rats was 8.25 ± 0.26 .

The present study was performed to assess the antifertility activity in male rats. The aqueous extract of seeds of *Butea monosperma* shows the spermicidal activity. In conclusion the aqueous extract of seeds of *Butea monosperma* could be an important source of spermicidal compounds.

References

1. Cooper T.G., Yeung C.H., **Recent biochemical approaches to post-testicular, epididymal contraception**, Human Reproduction Update 5(2):141-152 (1999).
2. Goldberg E, Calpastatin testis-specific isoform peptides for contraceptive vaccines and fertility diagnosis. PCT mt. Appl. WO 99 03, 490, 28 Jan (1999).
3. Howett M.K., Reider J.W.K., **Broad spectrum microbicidal and spermicidal compositions, devices, and methods**. PCT Int. Appi. WO, 9959,525 (Cl. A61K), 25 Nov (1999).
4. Handa SS, Sharma A and Chakraborti KK, **Natural products and plants as liver protecting drugs**. Fitoterapia. 1986, 57: 307-45.
5. Ashok SK, Somayaji SN and Bairy KL. **Hepatoprotective effects of Ginkgo biloba against carbon tetrachloride induced hepatic injury in rats**. Indian J Pharmacol, 200133(2): 260-6.