



## Effect of *Butea monosperma* on Reproductive Organs, Sperm Count and Testosterone of Male Albino Rat, *Rattus Rattus* (Wistar)

C.K. Deshmukh\* and S.K. Bhagat\*

\*Department of Zoology,

Sant Gadge Baba Amravati University, Amravati, (MS), INDIA

(Corresponding author: C.K. Deshmukh)

(Received 29 March, 2015, Accepted 27 May, 2015)

(Published by Research Trend, Website: [www.researchtrend.net](http://www.researchtrend.net))

**ABSTRACT:** The flowers of *Butea monosperma* are used for curing infertility in local tribes. However the validity has not been scientifically proven therefore the present study is aimed to evaluate the effect of methanolic flower extract of *B. monosperma* on male albino rat, *Rattus rattus* (Wistar). The extract of 100, 200 and 300 mg/kg body weight were administered for 15<sup>days</sup> and sacrificed. The weight of reproductive and vital organs found significantly increased ( $p < 0.001$ ) at 100 and 300 mg doses/kg body weight but testes' weight also found significantly increased ( $p < 0.001$ ) at 200 mg/kg body weight. Testosterone increased significantly ( $p < 0.001$ ) for all doses even in recovery period ( $p < 0.05$ ). At 300 mg /kg body weight the sperm count increased significantly ( $p < 0.001$ ). 300mg/kg body weight dose is found highly significant ( $p < 0.001$ ) for reproductive and vital organs, sperm count and testosterone except liver. Therefore the present observations concluded that extract of *B. monosperma* is able to improve reproductive function in male albino rat.

**Keywords:** *Butea monosperma*, testosterone, sperm count, infertility.

### INTRODUCTION

Infertility is one of the problems of human society. In the last few years, there is a marked decrease in the quality of semen (Carlsen, *et al.*, 1992). According to the World Health Organisation 10-15% of young couples are faced with infertility and in which 50% is due to male factor (Kaiser, 1988, Henkel and Bodekar, 2005 and Wani, *et al.*, 2011). About 25-40% young people is below the standard index in semen parameters (Andersens, *et al.*, 2000) and it is one of the major causes of divorces, disharmony, as a result the physical and the mental health disturbed (Badami, *et al.*, 2000, Kandeel, *et al.*, 2001). Allopathic remedies are proved to be best but have adverse side effects (Kulkarni and Reddy, 1998).

Medicinal plants and nutrients are used in improving the sexual health (Ashok Kumar and Arora, 2013). A large number of aphrodisiac plants are used throughout the world for their fertility properties (Bhatia, *et al.*, 2010).

India is well known for its richest biodiversity. It is evident that the various parts of the plants are used in Siddha, Unani, and Ayurvedic medicines for the treatment of various diseases of human beings. The active principles found in medicinal plants are alkaloids, glucosides, flavonoids, saponins, butrin and other complex compounds. These compounds may be found in root, stem, bark, leaf, fruit, and flower and seed (Nath and Khatri, 2010). *Butea monosperma* (family - Fabaceae) is popularly known as flame of the forest or bastard teak, grown widely in many parts of

India (Tondon, *et al.*, 1969). *B. monosperma* is used in the treatment of diabetes, leprosy, gout skin disease, eye disease, piles. It has laxative anthelmintic and antistress properties (Kasture, *et al.*, 1999; Burli, *et al.*, 2007). Flowers are reported to possess astringent, diuretic, depurative, aphrodisiac and tonic properties (Jadhe, *et al.*, 2009). In local tribes these flowers are used to cure and improve the sexual health as an aphrodisiac (Nadkarni, 2002). Not much work is done with respect to prove its validity scientifically therefore, the present study is aimed to evaluate the effect of methanolic flower extract of *B. monosperma* on male albino rat, *Rattus rattus* (Wistar).

### MATERIALS AND METHODS

#### A. Collection of Plant material

The flowers of *B. monosperma* were collected in the month of March in the year 2012 from Pohara jungle near to Amravati, Maharashtra and authenticated by department of Botany, Shri Shivaji Science College, Amravati.

#### B. Preparation of plant extract

The fresh flowers were shade dried, finely powdered in mixer and sieved. Later 500 gm powdered material was Soxhlet extracted with methanol for 20 hours in reduced pressure in rotary evaporator to obtain reddish orange powder (yield 25%). The dried extract was dissolved in distilled water and used for experimental work (Kehkashan and Siddiqui, 2011). The preliminary photochemical screening is done (Thimmaiah, 2004).

A total of 30 albino rat, *Rattus rattus* (Wistar), weighing 220-225 gm were used for the study and were brought from 'Institute of Pharmaceutical Education and Research', Borgaon (Meghe) Wardha (M.S.). The rats were kept in animal house of Pharmacy College of Vidyabharti, Amravati. The experiments were conducted according to "INSA-Ethical guidelines for use of animals for scientific research after permission from ethical committee (registration number [1504/po/a/11/CPCSE]). The rats were regularly fed on standard pellet diet provided by Trimurti feeds, Nagpur and water was given *ad libitum*. The remaining food and waste matter was removed from the cages on the next day and proper care was taken to avoid any infection. After acclimatization for fore night only healthy rats were used for the experiments.

### C. Experimental Design

The rats were divided into five groups, containing six rats/ group. The first group is treated as control and given orally distilled water 15ml/kg body weight. The pilot study was done for determining the doses. The doses of 100, 200, 300 mg/ kg body weight orally were given to the second to fourth group respectively for 15 days and were sacrificed after 15days. Fifth group has also received 300 mg dose/ kg body weight up to 15 day and after 15 days it is treated as recovery group for further 15days and later sacrificed.

The control and experimental groups of male rats were evaluated for their body weight then sacrificed and testis, seminal vesicle, epididymis, kidney, adrenal, vas deference were carefully removed and weighted accurately (Amini and Khamkar, 2005). The cardiac blood is used and serum was analysed for testosterone level by using Chemiluminescence Analyser and Autoplex –A processor for CLIA (Tietz, 1995 and Uotila, *et al.*, 1981).

### D. Sperm count

The sperm count was carried out by using Haemocytometer (Mukherjee and Kanai, 1988). The epididymis was removed and minced in 2 ml. of 0.9% saline. This sample was used for the sperm count. The spermatozoa with head and tail counted (Taylor, *et al.*, 1985; WHO, 1999).

### E. Statistical analysis

The data are expressed as mean  $\pm$ SE. Statistical analysis was done by student's *t*-test (Mahajan,1997).

## RESULTS AND DISCUSSION

### A. Effect on sexual and vital organ weight

Preliminary phytochemical screening of the methanolic extract of flower of *Butea monosperma* revealed the presence of flavanoids (aurones and chalcones) butrin, butin, and steroids (Jhade, *et al.*, 2009, Sharma and Deshwal, 2011). The oral dose of the flower extract of *B. monosperma* for 15 days to male rat was resulted in significant increase in the body weight, vital organs weight and reproductive organs weight (Table 1).

Same findings were reported when administration of aqueous seed extract of *Moringa oleifera* and *Hibiscus cannabinus* (Zade, *et al.*, 2013) aqueous extract of root of *Anacyclus pyrethrum* (Shahraki, *et al.*, 2013). In present study, highly significant increased ( $p < 0.001$ ) in weight at the dose 300 mg /kg body weight in testes, seminal vesicle, prostate, penis, vase difference as well as sperm count, kidney and adrenal gland except liver was found when compared with control animal. Even in 15 days of recovery periods highly significant ( $p < 0.001$ ) increased in weight of these organs except seminal vesicles and vase difference. Throughout the treatment weight of kidney is found to be increased significantly ( $p < 0.001$ ) but on other hand liver is remained unaffected except in recovery period. After administration of ethanolic extract of *Abelmoschus manihot* significantly increased, weight of body, organ weight, weight of testes, seminal vesicle and sperm count in treated groups were reported (Rewatkar, *et al.*, 2010). Many plants' components viz. steroid, saponins have increased fertility potentiating properties and also responsible for increasing testosterone level (Drewes, 2003; Shukla and Khanuja, 2004 and Gauthaman and Adaikan, 2008). Testosterone level of serum is significantly increased ( $p < 0.001$ ) at the dose of 100,200,300mg/ kg body weight and also at recovery period ( $p < 0.05$ ) when orally administered the aqueous extract of *B. monosperma* to *R. rattus* (Table 2). Steroids in plants are one of the reasons of increase sexual and vital organ weight (Thakur and Dixit, 2006). When 70% ethanolic extract of 200 and 400 mg/kg body weight of *Garcinia kola* and aqueous extract of *Piper guineense* at both doses 122.5 and 245 mg/kg body weight were given to rat there was significant increased in weight of testes and level of testosterone (Mabongue, 2004 and Ralebona, 2012). Sperm count is significantly increased ( $p < 0.001$ ) at 300mg/kg body weight (Table 2) in present observations and this may be presence of flavonoids in the flower of *B. monosperma* (Ratnasooriya and Jayakodi, 2006). Sperm motility has been considered as one of the most important predictors of fertility (Check, *et al.*, 1990 and Liu, *et al.*, 1991). After given dose of extract of *Ionidium suffruticosm* there was significant increase ( $p < 0.001$ ) in sperm count (Senthil Kumar and Vijayumar, 2012). Testosterone supplementation has previously been shown to improve sexual function (Aversa and Fabbri, 2001, Grahl, *et al.*, 2007) while working on hexane extract of *Mondia whitei* (Watcho, *et al.*, 2005) and combination of *Zanthoxylum leprieurri* and *P. guineense* (Kapomah, *et al.*, 2012) and aqueous extract of *Alpinia calcarata* rhizomes at 500mg/kg showed increased testosterone level on the reproductive organ of male rats (Ratnasooriya and Jayakodi, 2006). These observations also augmented with the earlier workers views (Rewatkar, *et al.*, 2010).

**Table 1: Effect of flower extract of *Butea monosperma* on body weight, vital organs' and reproductive organs' weight on male albino rat, *Rattus rattus* (Wistar) after given oral doses of 100, 200, and 300 mg./kg body weight for 15 and recovery days.**

Treatment Group	Doses mg/kg body weight	Body weight (gm)	Testes (gm)	Epididymis (gm)	Seminal Vesicle (gm)	Vas deference (gm)	Liver (gm)	Kidney (gm)	Adrenal (gm)	Penis (gm)	Prostate (gm)
Control	Vehicle	200.79±3.1	2.24± 0.01	0.406±0.0006	0.806± 0.002	0.33± 0.001	7.65± 0.20	1.50± 0.007	0.033±0.004	0.24± 0.001	0.284±0.001
II	100	232.0±3.25 **	2.33±0.01 **	0.505±0.0007***	1.54± 0.02***	0.301± 0.0005 ***	7.94±0.01 ns	1.52±0.002 ***	0.04± 0.001 ***	0.31±0.001 ***	0.301±0.004**
III	200	210.5± 0.5 **	2.80 ± 0.02 ***	0.409± 0.002 ns	1.04 ±0.001ns	0.374 ± 0.002 ***	8.30±0.02 **	1.64±0.0004 **	0.04± 0.007 ***	0.31±0.0006 ***	0.314±0.001**
IV	300	215.15± 1.5***	3.17 ±0.01 ***	0.384± 0.006**	1.085 ±0.001***	0.271± 0.001 ***	7.65± 0.005 ns	1.83±0.001 ***	0.04±0.0007 ***	0.30±0.0007 ***	0.392±0.01***
V Recovery	300	200.05± 1.4ns	2.83±0.007 ***	0.413± 0.001***	0.80 ± 0.002ns	0.331 ± 0.001 ns	7.20± 0.002 *	1.51±0.002 ***	0.38±0.0001***	0.27±0.001 ***	0.288± 0.002***

Values are in Mean ± S.E. (standard error), n = 6, \*p<0.05, \*\*p<0.01, \*\*\*p<0.001, when compared with control, ns-non significant

**Table 2 : Effect of methanol extract of flower of *Butea monosperma* on male albino rat, *Rattus rattus*( Wistar) on testosterone level and sperm count.**

Treatment Groups	Doses Mg/kg B. weight	Testosterone (ng/ml)	Sperm count (No. of sperm/rat/10 <sup>6</sup> )
Group I Control	Vehicle	1.39± 0.005	42.60±
Group II	100	2.27 ± 0.01 ***	44.12 ± 1.842 NS
Group II	200	2.43± 0.01 ***	46.58 ± 1.878 *
Group IV	300	3.11± 0.10***	51.78 ± 1.977 ***
Group V	300	1.44± 0.02*	45.74 ± 2.633 NS

Values in Mean ± S.E. (Standard error), n = 6, \*p<0.05, \*\*p<0.01, \*\*\*p<0.001, when compared to control, ns-non significant.

**CONCLUSION**

Thus, the present observations conclude that methanolic extract of *Butea monosperma* at 300mg dose is highly significant ( $p < 0.001$ ) for reproductive and vital organs, sperm count and testosterone except liver and it does not create the toxicity. Hence, we can say that the flower of *Butea monosperma* can improve reproductive function in male albino rat, *Rattus rattus* (Wistar).

**REFERENCES**

- Amini, A. and Kamkar, F. (2005). The effects of gossypol on spermatogenesis in NMRI mice. *Iranian Journal Sci and Technol Trans.* **29**: 123-133.
- Andersen, A.G., Jensen T.K., Carlsen, E., Jorgensen, N., Andersson, A.M. & Krarup, T. (2000). High frequency of sub optimal semen quality in an unselected population of young men. *Hum Reprod.* **15**(2): 336-372.
- Ashok Kumar and Arora R. (2013). Medicinal Plants Effective In Treatment of Sexual Dysfunction: A Review. *Journal of Medicinal Plants Studies.* **1**(1): 1 -6.
- Aversa, A. and Fabbri, A. (2001). New oral agents for erectile dysfunction: what is changing in our practice? *Asian Journal Androl.* **3**: 175- 179.
- Badami, S., Desai, V.B. & Suresh P. (2000). Drugs play major role in male infertility. *Express Pharma Pulse.* **2**: 18.
- Bhatia, D.K., Sharma, A.K., Pathania, P.C. & Khanduri N.C. (2010). Antifertility effects of crude different of *Adiantum lunulatum* Burm on Reproductive Organs of male albino rats. *Biological Forum -An International Journal.* **2**(2): 88-93.
- Burli, D.A & Khade A.B. (2007). A comprehensive review on *Butea monosperma* (Lam). *Kuntz Pharmacognosy Review.* **1**(2): 333- 337.
- Carlsen, E., Giwercman, A., Keiding, N. & Skakkeback, N.E. (1992). Evidence for decreasing quality of semen during past 50 years. *British Medical Journal.* **12**: 609-613.
- Check, J.H., Bollendorf, A. & Lee. M.A. (1990). Correlation of computerized semen analysis with successful fertilization of oocytes in an *in vitro* fertilization program. *Arch.Androl.* **24**: 229-234.
- Drewes, S.E., George, J. & Khan, F. (2003). Recent findings on natural products with erectile dysfunction activity. *Phytochemistry.* **62**: 1019 - 1025.
- Gauthaman, K. and Adaikan, P.G. (2008). The hormonal effect of *Tribulus terrestries* and its role in the management of erectile dysfunction - an evaluation using primates, rabbit and rat. *Phytomedicine.* **15**: 44-54.
- Grahl, F.S., Aversa, A. Yassin, A.A. Kadioglu A, Monocada I. & Eardley I. (2007). Effects of testosterone on erectile function: implications for the therapy of erectile dysfunction. *Br. Journal Urol Int.* **99**: 988-92.
- Henkel, R.G. and Bodekar, R.H. (2005). Sperm function and assisted reproduction technology. *Rprod Med. Biol.* **4**: 7-30.
- Jadhe, D. Ahirwar, D., Sharma, N.K., Jain R. & Gupta S. (2009). *Butea monosperma* (Lam.) Taubert. A Review. *Journal of Pharmacy Research.* **2**(7): 1181-1183.
- Kaiser, F.E., Viosca, S.P., Morle, J.E., Moradian, A.D, Davis, S.S. & Koreman, S.G. (1988). Importance and aging: Clinical and hormonal factors. *Journal of American Geriatrics Society.* **36**: 511-519.
- Kandeel, F.R., Vivien, K.T. & Ronald, S.S. (2001). Male sexual function and its Disorder: Physiology, Pathophysiology, Clinical investigation and Treatment. *Endocrine Reviews.* **22**(3): 342-38.
- Kasture, S.B., Bhatwadekar A.D., Chintawar S.D., Logade, N.A., Somani, R.S. & Kasture, V. (1999). Antistress activity of *Butea monosperma* flowers . *Indian Journal of Pharmacology.* **2**(31): 1153-156.
- Kehkashan P. and Siddiqui W. A. (2011). Protective effect of *Butea monosperma* on high -fat diet and streptozotocin induced non -genetic rat model of type 2 diabetes : Biochemical and histological evidences . *International Journal of Pharmacy and Pharmaceutical Sciences.* **3**(3): 74-81.
- Kpomah, E.D., Uwakwe, A.A. & Abbey, B.W. (2012). Aphrodisiac studies of diherbal mixture of *Zanthoxylum leprieurii* Guill and per and *Piper guineense* Schumach and thorn on male rats (Wistar). *Global Journal of Research on Medicinal Plants and Indigenous Medicine.* **9**(1): 381-390.
- Kulkarni, S.K. and Reddy D.S. (1998). Pharmacotherapy of male Erectile Dysfunction with sildenafil. *Indian Journal of Pharmacology.* **30**: 367-378.
- Liu, D.Y., Clark, G.N & Baker, H.W.G. (1991). Relationship between sperm motility assessed with the Hamilton -Thorn motility analyser and fertilization rates *in vitro*. *Journal Androl.* **12**: 231-239.
- Mahajan, B.K. (1997). *Methods in Biostatistics.* 6th Ed. Lordson Publication, New Delhi, p.398-410
- Mbongue, F.G.Y., Kamtchouing, P., Essame, D.J.L., Yewah, P.M., Dimo, P. & Lontsi, D. (2004). Effect of the aqueous extract of dry fruits of *Piper guineense* on the reproductive function of adult male rat. *Indian Journal of Phrmacol.* **37**(1): 30-32.

- Mukharji, K.L. and Kanai, L. (1988). Medical Laboratory Technology Procedure Manual for Routine Diagnostic Test vol. III Tata Mc Graw Hill Pub. Ltd, p.800-802.
- Nadkarni, K.M. 2002. Indian Materia medica (Bombay Popular Prakashan) I pp223-225.
- Nath Vjendra and Khatri Pawan Kumar, (2010). Traditional knowledge on ethno-medicinal uses prevailing in tribal pockets of Chhindwara and Betul Districts, Madhya Pradesh, India. *African Journal Pharmacy and Pharmacology*. **4**(9): 662-670.
- Ralebona, N., Sewani-Rusike, C.R. & Nkeh-Chungag, B.N. (2012). Effects of ethanolic extract of *Garcinia kola* on sexual behaviour and sperm parameters in male (Wistar) rats. *African Journal Pharmacy and Pharmacology*. **6**(14): 1077-1082.
- Ratnasooriya, W.D. and Jayakodi, J.R.A.C. (2006). Effect of aqueous extract of *Alpinia calcarata* rhizomes on reproductive competence of male rat. *Acta Biologica Hungarica*. **57**(1): 23-3.5
- Rewatkar, K.K., Naiyer, S., Ayaz, A., Khan, M.I. & Ganesh, N. (2010). A landmark Approach to Aphrodisiac Property of *Abelmoschus manihot*. *International Journal of Phytomedicine*. **2**: 312-319.
- Senthil Kumar, B. and Vijaya Kumar, J. (2012). Effect of *Iodinium suffruticosum* on testes of young albino rat. *International Journal of Pharmacy and Biological Sciences*. **2**: 106-112.
- Shahraki, M.R., Shahraki, S., Arab, M.R. & Shahrakipour, M. (2013). The effect of aqueous extract of *Anacyclus pyrethrum* on sperm count and reproductive organs in adult male rats. *Zahedan Journal of Research in Medical Sciences*. **15**(10): 20-20.
- Sharma, A. and Deshwal, N. (2011). An over view: on Phytochemical and Pharmacological studies of *Butea monosperma*. *International Journal of Pharma Tech Research*. **2**(3): 864-871.
- Shukla, K. and Khanuja, S. (2004). Chemical, Pharmacological and botanical studies on *Pedaliium murex*. *Journal Med Aromatic Plant Sci*. **26**: 64- 96.
- Taylor, G. T., Weiss, J., Frechmann, T. & Heller, J. (1985). Copulation induces an acute increase in epididymal sperm numbers in rats. *Journal of Reproduction and Fertility*. **73**(2): 323- 327.
- Tandon, S.P., Tewari, K.P. & Saxena, V.K., (1969). Chemical examination of the roots of *Butea monosperma*, In: *Proceedings of National Academy of Science, India*, **32**: 237-239.
- Thakur, M. and Dixit, V.K. (2006). Effect of *Chlorophytum borivilianum* on androgenic sexual behaviour of male rats. *Indian Drugs*. **43**: 300-306.
- Thimmaiah, S. R. (2004). Standard Methods of Biochemical Analysis 2nd Ed., New Delhi Kalyani Press, pp.179.
- Tietz, N.W. 1995. Clinical Guide to Laboratory Tests. 3rd Ed. WB Saunders Company, Philadelphia, p.146-147
- Uotila, M., Ruoslathi, E. & Envall, E. (1981). Two-sites Sandwich enzyme immunoassay with monoclonal antibodies to human alpha fetoprotein. *Journal Immunol Methods*. **42**: 11-15,
- Wani, J.A., Rajeshwra N, & Nema R.K. (2011). Phytochemical Screening and aphrodisiac activity of *Asparagous racemosus*. *International Journal of Pharmaceutical Sciences and Drug Research*. **3**(2): 112-115.
- Watcho, P., Donfack, M.M., Zelefeack, F., Nguelefack, T. B., Wansi, S., Ngoula, F. & Kamanyi, A. (2005). Effects of the hexane extract of *Mondia whitei* on the reproductive organ of male rat. *African Journal Trad CAM*. **2**(3): 302- 311.
- Wawata, A.U., Dikko, A. A.U., Olorunshola, K.V., Wawata, M.U., Attahir, A. & Ahmed, M.K. (2010). The effect of aqueous methanolic stem bark extract of *Acacia polyacantha* on sexual behaviour, serum testosterone levels in male rats Wistar. *Asian Journal of Medical Sciences*. **2**(3): 138-140.
- World Health Organization, 1999. Laboratory manual for the examination of human semen and semen- cervical mucus interaction. 4<sup>th</sup> ed, Cambridge University Press, New York. pp.81
- Zade, V.S. Dhabhadkar, D., Thakare, V.G., & Pare, S.R. (2013). Effect of aqueous extract of *Moringa oleifera* seed on sexual activity of male albino rats. *Biological Forum -An International Journal*. **5**(1); 129-140.
- Zade, V. and Dabhadlkar, D. (2013). Evaluation of potential aphrodisiac activity of *Hibiscus cannabinus* (Linn.) seeds in male albino rat. *Int Journal Pharmacy Bio Sci*. **3**: 276-286.