



RESEARCH ARTICLE

LONG TERM INTAKE OF SESAMOL INCREASES EPIDYDYMAL SPERMATOCYTE RESERVE IN MALE WISTAR ALBINO RATS

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ABSTRACT

Infertility is a major issue which affects population worldwide. We aimed to evaluate the long term effect of one of the active component of sesamum indicum, sesamol on spermatogenic activity in male wistar albino rats. The animals were divided into experimental group and control group. (n=6 each) The experimental groups were orally administered with sesamol (25mg/kg bwt) for 6 weeks. The control group received the same volume of 0.9% saline for the same duration. Differences between the groups were analyzed by unpaired t test. Oral administration of sesamol showed a significant (P < 0.01) increase in the weight of the reproductive organs. Further, significant increase (P < 0.001) in total sperm count was seen in treated group of rats when compared to controls.

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INTRODUCTION

Infertility is a major medical problem which can affect people of all levels of socioeconomic background. It affects approximately 10-15% of couples throughout the United States. Approximately 30% of infertility is due to a male factor. This may be due to exposure to environmental hazards or hormonal variations (Sharpe *et al* 2003, Shittu *et al* 2006). Many of the Ayurveda literature claims the several health benefits of plant product *Sesamum indicum*. (Vishwanath Dwivedi). The botanical name of tila is *Sesamum indicum* and it belongs to family pedaliaceae. It is commonly known as Til (Hindi), hu ma (Chinese), sesame (French), goma (Japanese), gergelim (Portuguese) and ajonjolí (Spanish)(Chakraborty.G.S *et al*). The tila seeds (Sesame seeds) contain many vitamins like thiamine, niacin, riboflavin, nicotinic acid, pantothenic, folic and ascorbic acids, choline, inositol, pyridoxine, vitamin A, and tocopherol. Sugars present are glucose, sucrose, galactose, planteose and raffinose. The fatty acids in the seeds are myristic, palmitic, stearic, arachidic, oleic, linoelic, and hexadecenoic and linoceric acids. (Shittu Lukeman *et al* 2008). *Sesamum indicum* has few antioxidants such as sesamol, sesamolin sesamin which may improve male fertility (EA Ashamu *et al*, Kotade kiran *et al* 2008). Moreover, phytoestrogens present in sesamol is responsible for maintaining the differentiated epithelial morphology of the male reproductive organs through an unknown mechanism. (Shittu Lukeman *et al* 2006) However, sesame lignans such as sesamin, episesamin, sesamolin, and

sesamol isolated from *Sesamum indicum* and *radiatum* seeds among other species are implicated as having certain properties such as anti tumorigenic (Hirose *et al.*, 1992), estrogenic and/or antiestrogenic (Collins *et al.*, 1997) and antioxidant (Kang *et al.*, 2005). Thus, estrogen or its receptor is important for normal functioning of the male reproductive tract in numerous species (Hess & Carnes, 2004).

Most previous studies have evaluated the role of isoflavonoids and other types of phytoestrogens other than sesame lignans. However, due to lack of knowledge, we aimed to evaluate reproductive effect of sesamol i.e. the active component of *Sesamum indicum* on the adult male albino rats using seminal analysis.

MATERIALS AND METHODS

Animals: Adult male albino rats of Wistar strain (200-275gms) which were inbred in the institutional animal house were used for the present study. Animals were housed individually in polypropylene cages (29cms x 22cms x 14cms) with paddy husk bedding under normal day-night cycle in temperature controlled room during the experimental period. Food pellets (Amrut laboratory animal feed, Amrut rat pellet. Pranav Agro Industries Ltd, Maharashtra, India), portable tap water was made available to animals *ad. Lib.* All experiments were conducted with strict adherence and principles contained in CPSEA guidelines. Institutional ethical committee approval was obtained before the commencement of the animal experiments.

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Drugs and Treatment

Sesamol procured from Sigma Aldrich (Catalogue.No.S8518) was dissolved in 0.9% saline before use and administered orally at a dose of 25mg/kg bwt at a volume of 0.1ml/10g body weight. Acute Toxicity study was not done as it is a component of food supplement. The dosage was selected based on the previous work (Sriram Chandrasekhar *et al* 2013). Control groups were orally administered with 0.9% saline.

Experimental Design

The animals were divided into two groups, the experimental group and control group (n=6 each). The experimental groups were orally administered with sesamol (25mg/kg bwt) for 30 days in long term. The control group received the same volume of 0.9% saline. At the end of the experimental period, animals were anesthetized (Pentobarbitone sodium, 40 mg/kg, i.p.) and then sacrificed by the terminal dose of the same. The laparotomy was performed and the reproductive organs were exposed after the last day of the drug injection in each group. The epididymis was carefully separated from the testis. Both the testis were removed, cleaned of accessory tissues and weighed.

Sperm Count (Rekha D Kini Et Al 2009)

The epididymus was minced in 1 ml of phosphate buffered saline (Ph 7.2) to obtain a suspension. The suspension was filtered through a nylon mesh. The sperm count was conducted in the filtrate as per the standard method in Neubauers chamber. An aliquot from the suspension (0.5) was taken in hemocytometer and diluted with phosphate buffered saline up to the mark 11. The suspension was well mixed and charged into Neubauers counting chamber. The total sperm count in 8 squares (except the central erythrocyte area) of 1 mm² each was determined and multiplied by 5X10⁴ to express the number of spermatozoa/epididymis.

Statistical analysis: Results were expressed as mean± S.E.M. obtained by groups of 6 animals each. Differences between the groups were analyzed by unpaired t test using Graph Pad Prism Software (version 5) with the experimental groups being compared with the vehicle control. Significance was set at P < 0.05.

RESULTS

Oral administration of sesamol showed a significant (P < 0.01) increase in the weight of the reproductive organs, Further, significant increase (P < 0.001) was observed in the total sperm count was seen in treated group of rats when compared to controls.

Table 1 Effect of Oral administration of sesamol on reproductive parameters in rats; Mean ± SEM, n=6 in each group

PARAMETERS		Control	Treated
Testicular weight	Left testis	0.009±0.0005	0.018±0.003**
	Right testis	0.010±0.0003	0.023±0.0042**
Sperm count		565.16±33.35	1411.33±24.46***

DISCUSSION

In the present study the oral administration of sesamol increased sperm count significantly and testicular weight was also found to be increased. Similar findings were documented earlier with methanolic extract of sesame (Salawu *et al*

2009). Increase in testicular organ weight is consistent with the previous study (shittu *et al* 2006). Androgens stimulate spermatogenesis, produce hypertrophy of prostate, seminal vesicles, muscle, bone and kidney cells. It is anabolic. (Vasudevan & Sreekumari) This finding perfectly explains the increase weight of reproductive organ as seen in the present experiment.

Sesame lignans have been shown to increase tissue tocopherol levels by inhibition of cytochrome P450 3A-dependent n-hydroxylase pathways of tocopherol catabolism and/or regeneration of oxidized tocopherol, hence potentiating the antioxidants activity of tocopherols in lipid peroxidation system in-vitro (Hemalatha *et al*). This synergism between Vitamin E and sesame lignans enhance the morphological as well as quality of the sperm produced as evidenced in the present study

To the best of our knowledge, this is the first study which reflect the effect of sesamol ie the active component of *Sesamum indicum* on spermatogenic activity in male wistar rats. Sesame has high proportionate of trace elements, vitamins, antioxidants and phytoestrogens which may help in enhancing reproductive potential in male rats. But the mechanism of action still needs to be elucidated.

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