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## EFFECT OF *DAUCUS CAROTA* SEED EXTRACT ON SEMEN PARAMETERS IN MALE ALBINO RATS

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## ABSTRACT

Effects of *Daucus Carota* seed extract on semen parameters of male albino rats were investigated in the present study. Two different dose of *Daucus Carota* seed extract i.e. 200mg, 400mg/kg b.w were administered orally in sexually mature rats (n = 10) for 30 days. The results showed that there was a decrease in semen parameters (sperm count, motility) and abnormality in semen morphology was also observed. Treatment also caused decrease in weight of testes and other accessory reproductive organs. The result of the present study concluded that ethanolic extract of *Daucus Carota* seed inhibit sperm concentration and motility in male rats which might suppresses the male fertility.

## INTRODUCTION

*Daucus carota* (family Apiaceae) is an annual or biannual herb mostly confined to the temperate region of Asia, Europe and Africa (Nadkarni, 1976). It has been reported that the extract obtained from the *Daucus carota* possesses analgesic, anti-inflammatory (Hoogewerf and Pasriche, 2006) antifertility (Prakash, 1984) anti-tumour (Abou Zainab *et al.*, 2008) hepatoprotective (Bishaye *et al.*, 1995) and hypoglycaemic properties (Neef *et al.*, 1995). Recently pharmacological studies have shown that *Daucus Carota* seed exhibit anti-fertility properties in females (Mujumdar *et al.*, 1997). Researchers have also found that treatment with carrot seed extract can lead to a significant inhibition of 5, 3-beta hydroxyl steroid dehydrogenase and glucose 6- phosphate dehydrogenase, the two key enzymes involved in ovarian steroidogenesis in mouse ovaries. In another in-vitro studies carried out using an isolated rabbit ovarian perfusion system, it was found that progesterone and human chorionic gonadotrophin secretions significantly diminished, after the acute feeding of carrots (Keenan *et al.*, 1997). But, no study on the antifertility effect of *Daucus carota* seed in male rat has been reported. So the present study was undertaken to evaluate the antifertility effect of *Daucus carota* seed extract on male albino rats.

## MATERIALS AND METHODS

### Plant material

The seeds of *Daucus carota* used for extraction were obtained from Birsa Agriculture University Ranchi and was authenticated in the Department of Botany, Ranchi University, Ranchi.

### Preparation of seed extract

After authentication, seeds were cleaned and milled into coarse powder by a mechanical grinder. Powdered seeds (2kg) were extracted with 95% ethanol using a soxhlet apparatus. The ethanolic extract was filtered and concentrated by distillation process. A brownish green coloured residue was obtained (6.79% w/w), which was kept in a desiccators. This ethanolic extract of *Daucus carota* seed was used for further experiment.

### Animals

30 male albino rats (130-180g) were divided into three groups (n = 10). Each group was kept in a separate cage. Group I served as control and treated with vehicle only. Group II and group III were treated with carrot seed extract at the rate of 200mg/kg and 400mg/kg b.w. respectively for 30 days.

### Determination of body and reproductive organ weight

After 24 hours of last treatment, weight of the animals were recorded and then sacrificed. After scarification, testes, epididymis, vasdefrens, seminal vesicle and ventral prostrate were dissected out, trimmed off of extraneous tissues and weighed accurately on balance. The organs weights were expressed in term of mg/100g

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body weight.

#### Assessment of sperm count, motility and morphology.

Sperm from the cauda epididymis were released by cutting and was suspended into 2mL of medium (Hams F10) containing 0.5% bovine serum albumin (Wang *et al.*, 2006). After 5min incubation at 37°C the cauda epididymis sperm reserves were determined using the standard hemocytometric method (Aman and Almquist, 1961). Sperm motility was analysed using a microscope (Olympus IX7) at 10 successive fields for each sample and reported as the percentage mean of the motile sperm of each sample according to the World Health Organisation (WHO) method. Morphological abnormalities in sperm were observed by the method of Linde *et al.* (1992)

#### Statistical analysis

Data were expressed as mean  $\pm$  SEM. Significance difference between means was determined by student t-test and one-way analysis of variance (ANOVA). P value  $<0.05$  was considered as significant.

## RESULTS AND DISCUSSION

The present study showed a decrease in body weight of animals of group II and group III (treatment groups) in comparison to control group animals. The decrease in weight was more in groups receiving higher dose of extract (table 1). Weight of testis and accessory male reproductive organs like epididymis, vas deferens, seminal vesicles and prostate were measured. A significant decrease ( $p < 0.05$ ) in the weight of testes and the accessory reproductive organs were observed after the treatment with extract and the reduction was dose dependent *i.e* the decrease was more in high dose treated animals in comparison to low dose animals (Table 1). Table 2 shows the result of the study on semen parameters. Sperm count significantly decreased from  $43.0 \pm 5.0 \times 10^6$  to  $32.5 \pm 2.5 \times 10^6$  and  $26.50 \pm 1.5 \times 10^6$  in group II (low dose animals) and group III animals (high dose animals) respectively. Sperm motility also decreased to a significant level and the reduction was more in groups receiving higher dose of extract (group III) followed by low dose group (group II) Abnormality in sperm morphology was also observed in treated animals, the value of which is given in percentage as shown in Table

2.

Plants are used globally as therapeutic agents since ancient times (D'Cruz *et al.*, 2010). Several plant products inhibit male and female fertility and may be developed into contraceptives. Several plants are reported to enhance reproductive process and some are known to hamper such functions. Various medicinal plants had been tested for their anti-fertility activity both in male and female (Kamboj, 1998).

The body weights and reproductive organs weight were measured in the present study and results showed that there were alteration in body weights and reproductive organs weight after the treatment with *Daucus Carota* seed extract. The body and reproductive organ weights give information on the general well being of reproductive health of the animal. The decrease in the weights and reproductive organs were observed and it was found to be more significant in the group III animals, receiving higher dose of extract. The decrease in the weight of testes and other accessory reproductive organs might be due to low level of androgen which was not enough to maintain the reproductive and accessory reproductive organ (Sharma and Jacob, 2001). It is known that accessory reproductive organ namely epididymis and vas deference are target organs which depend on androgen and they display differential sensibility to androgens for maintenance of their structure and function. It is also known that internal microenvironment of epididymis is affected by any change in circulating androgens and thus lead to alteration in sperm mobility and metabolism (Khan and Awasthy, 2003). Depression in spermatogenesis is usually accompanied with reduced testicular weight since bulk of testicular weight is made up of spermatid and spermatozoa (Mann and Ludwak, 1981) Sperm count and sperm motility in cauda epididymis was also found to be decreased in the present study. These may be due to the interference of extract with spermatogenesis and epididymal functions. These decrease is suggestive of alternation in sperm maturation and sperm production (Sarkar *et al.*, 2000). The present result is in agreement with studies related to various other plants extract (Njar *et al.*, 1995, Raji and Bolarinwa 1997, Parween *et al* 2002) The sperm count is considered as one of the important parameters to assess the effect of any agents on spermatogenesis (Suryavarthi *et al*, 2005, Reddy *et al.*, 2006). The results of this study also demonstrated that the *Daucus carota* seed extract causes structural

**Table 1: Effect of *Daucus carota* seed extract on Body weight and Reproductive organ weight of male albino rats**

Treatment Group	Body weight(gm)		Testis(gm)	Epididymis(mg)		VD(mg)	SV(mg)	Prostrate(mg)
	Before	After		Caput	cauda			
Group I	191.51 $\pm$ 8.34	194.51 $\pm$ 9.53	2.015 $\pm$ 0.30	123.36 $\pm$ 5.94	231.55 $\pm$ 8.33	103.33 $\pm$ 3.12	250.11 $\pm$ 9.39	154.23 $\pm$ 5.33
Group II	206.14 $\pm$ 7.32	199.33 $\pm$ 3.61*	1.932 $\pm$ 0.62*	119.27 $\pm$ 1.53*	221.15 $\pm$ 6.09*	94.31 $\pm$ 2.11	231.95 $\pm$ 7.11	142.32 $\pm$ 6.36
Group III	210.55 $\pm$ 9.31	182.53 $\pm$ 5.71*	1.873 $\pm$ 0.74*	212.56 $\pm$ 9.21*	180.53 $\pm$ 5.71*	114.12 $\pm$ 4.66	223.45 $\pm$ 7.32	141.13 $\pm$ 7.111

Each value is SEM of 10 animals \*P < 0.05 control vs treated

**Table 2: Effect of *Daucus Carota* seed extract on the sperm concentration and motility in the epididymis of adult male albino rats**

Groups	Dose(mg/kg)	Sperm Count( $\times 10^6$ /ml)	Sperm motility (%)	Normal morphology(%)
Group I	Control	43.0 $\pm$ 5.0	75.0 $\pm$ 50	49.71 $\pm$ 2.3
Group II	200	32.5 $\pm$ 2.	4.50 $\pm$ 0.5*	46.13 $\pm$ 1.99
Group III	400	26.50 $\pm$ 1.5*	3.50 $\pm$ 1.5*	44.40 $\pm$ 3.2

Each value is SEM of 10 animals \*P < 0.05 control vs treated

abnormality in sperm and decreases functional competence of sperm. Reduction in sperm count, sperm motility and alterations in sperm morphology following the treatment with carrot seed extract in the present study suggest the possible exploitation of this seed as an antifertility agent.

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