Anti fertility effect of *Curcuma longa* on seminal quality of Swiss albino male mice *Mus musculus*

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Abstract: The *Curcuma longa* is one of the most potential medicinal plant, its needed to develop new acceptive, cheaper, indigenous male contraceptive device of plant which are biologically active, eco-friendly, reversible contraceptive pill and without carcinogenic. *C. longa* dye is widely used as potent colours for food and turmeric in many countries. This work focuses primarily on the effects of *Curcuma longa* on seminal quality of Swiss albino male mice *Mus musculus*. The sperm profile has been taken an account. The mice were divided into 2 Groups i.e. Group I (Control), Group II (mice fed with *C. longa* extract) has been taken for experiment. The dose of *C. longa* was 200mg/kg b.w to group II. The results show that the *C. longa* when fed to Gr II mice, decreased significantly the sperm count (p<0.05, p<0.01), sperm motility (p<0.05), pH (p<0.05) whereas marked increase in the sperm mortality (p<0.05, p<0.01) when compared with mice of Gr-I. This study suggested that the extract may have beneficial effect for antifertility effect on seminal quality of mice.

Key words: *Curcuma longa* extract, seminal quality, Swiss albino male mice, antifertility assessment.

Introduction

*Curcuma longa* is one of the important species crops in India play a viral role in the national economy. India is the largest producer exporter’s turmeric in the world accounts for than 50% of the world trade (Philip et al, 1983). *Curcuma longa* is also known as Haldi in India. Turmeric is a perennial herbaceous plant. Its active ingredient is Curcumin it has a distinctly early, sightly better, curcumin has been a centre of a attraction for potential treatment of an array of disease, including cancer (Sullium et al., 2007 and Daily et al., 2016), diabetes disease (Lian et al., 2010), allergies (Agiel et al., 1992), anti-arthritis and antiinflammatory (Chandra et al., 1972 and White et al, 2019) and chronic illnesses (Scartezzini et al., 2000). Turmeric plays an important role in health skin reported by Sivamani et al in 2016. The effect of turmeric extracts for the treatment of knee osteoarthritis specially efficacy and safety of health (Wang et al, 2019). Turmeric gives the energy of the ‘Delaine mother’ and grants prosperity of health. Turmeric is effectual for purification the chakras, as well as purifying the path of the subtle body. This study was therefore designed to investigate the antifertility effect of *Curcuma longa* in Swiss albino male mice.

Materials and Method:

Animals: Experiment was performed on 6 to 8 weeks old healthy laboratory inbred male *Mus musculus* weighing about 30 -35 grams. The animals were obtained from University Department of Zoology, Bhagalpur. Mice were reared and maintained at the animal house of University Dept. of Zoology, T.M.Bhagalpur University, and Bhagalpur under standard conditions and fed with nutritional diet and water.

Collection of Plant material: *Curcuma longa* powder has been procured from own home product (with the help of ECHO Technical Note, By Beth Doerr and Lindsay Cameron, 2005, North Fort Myer, FL 33917, USA) Bhagalpur, Bihar, India.

Experimental Design: The mice were divided into 2 groups of 06 animals each. Gr-I (control mice), Gr-II, (mice fed with *Curcuma longa* powder).

Dosage: The control group was given normal food and water. *C. longa* was administered orally 200 mg/kg b.w/day (Chattopadhyay et al., 2013) group II for 20, 40 and 60 days duration.

Biological assays: Observation of sperm count, mortality, motility and seminal pH.

Sperm counting: The cauda epididymis were incised and the sperm were allowed to swim for 15 minutes. Solution of 1:10 dilution was made by adding 90 ml of distilled water to 10ml of sperm suspension. Sperm counts were done by using haemocytometer (Rastogi and Levin 1987).

Statistical analysis: Data were analyzed using a one way ANOVA followed with a post hoc test (least square division test) using the SPSS for comparison between different treatments. Results were presented as mean ± S.E and differences were considered as significant when p<0.05 and p<0.10.

Result: The results show that the *C. longa* extract when fed to Gr-II mice, decrease significantly the sperm count, sperm motility and pH at 5% and 10% level where as marked increase in the sperm mortality (p<0.05,0.10) when compared with mice of Gr-I at 20, 40 and 60 days incubation period. This study suggested that the extract may have beneficial effect on seminal quality of male mice when treated with *Curcuma longa* powder. The total sperm count in control group was recorded from 115.05±1.04 million/mm³ to 115.06±2.04 million/mm³ after 20, 40 to 60 days incubation period. Significant decrease in the total sperm count was recorded in C.
longa exposed (Gr-II) male mice from 98.75±2.19 million/mm³ at 20 days, 79.56±1.56 million/mm³ in 40 days and 51.24±0.96 million /mm³ in 60 days incubation period, when compared to control groups mice (p < 0.05 and p < 0.10). In case of sperm motility, Group I was recorded from 51.24±0.96 million /mm³ to 89.12±2.13 million /mm³ but when treated with C. longa decrease the motility rate of sperm after 20, 40 and 60 days incubation period in Gr-II mice at 70.75±2.98 million /mm³, 42.87±2.06 million /mm³ and 21.37±1.85 million /mm³. Upon treated with C. longa increase the sperm mortality rate after different incubation period from 29.85±0.23 million /mm³ to 79.26±0.19 million /mm³. Estimation of seminal pH in control group of mice 7.04±1.69 but exposed after 20, 40 and 60 day’s period its decrease 5.96±0.19, 3.85±2.38 and 2.01±0.11. Statistical analysis showed that the source of variance between groups and within groups were found to be significant to all exposure period at 5% and 10% of confidence (p<0.05, p<0.10). Data were also analysed and compared using t-test paired sample mean against Gr-I and Gr-II at 5% and 10% level.

Table: 1. Showing sperm count (million/cmm) treated with C. longa at different exposure period.

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Exposure Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 Days</td>
</tr>
<tr>
<td>Control Group</td>
<td>115.05±1.04</td>
</tr>
<tr>
<td>Treated Group</td>
<td>98.75±2.19</td>
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</tbody>
</table>

Graph: 1. Histogram show the total sperm count (million/mm³).

Table: 2. Showing sperm motility (million/cmm) treated with C. longa at different exposure period.

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<tbody>
<tr>
<td></td>
<td>20 Days</td>
</tr>
<tr>
<td>Control Group</td>
<td>51.24±0.96</td>
</tr>
<tr>
<td>Treated Group</td>
<td>70.75±2.98</td>
</tr>
</tbody>
</table>

Graph: 2. Histogram show the sperm motility (million/mm³).

Table: 3. Showing sperm mortality (million/cmm) treated with C. longa at different exposure period.
Experimental Group | Exposure Period
--- | ---
Control Group | 20 Days 10.98±0.05 40 Days 10.97±0.03 60 Days 10.98±0.01
Treated Group | 20 Days 29.85±0.23 40 Days 57.92±0.00 60 Days 79.26±0.19

**Graph: 3.** Histogram showing the sperm mortality (million/mm³).

Table: 4. Showing Seminal pH treated with C. longa at different exposure period.

<table>
<thead>
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<th>Experimental Group</th>
<th>Exposure Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>20 Days 7.04±1.69 40 Days 7.01±1.43 60 Days 7.03±0.98</td>
</tr>
<tr>
<td>Treated Group</td>
<td>20 Days 5.96±0.19 40 Days 3.85±2.382 60 Days 2.01±0.11</td>
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**Graph: 4.** Histogram showing the seminal pH.

**Discussion:**
The results show that the *Curcuma longa* extract when fed to Group II male mice, showed the significant affect of Sperm parameters and seminal pH when compared with mice of Gr-I. Sperm count is essential factor for fertility in mice like other mammals as well as human subjects. If sperm counts are reduced, the fertility of mice is impaired, when treated with C. longa (Grizzle *et al.*, 1987 and Forsyth *et al.*, 2019). Grizzle in 1987 reported that the motility is one of the important factors for fertilization process. Hence, if motility is reduced, the fertility of male mice is impaired. Among C. longa treated group of mice sperm mortality is significantly higher than control group mice, because C. longa lower the pH of semen, so it creates unfavorable environment for the sperm that’s why mortality increased (Chauhan *et al.*, 2001). If there is higher mortality among sperm, in spite of normal motile sperm counts, the fertility rate is reduced, in case of mice and also in different mammals. Chauhan *et al.*, 2001 reported that the low level of pH cause higher mortality in sperm. The normal (7.4) seminal pH
is essential factor for the capacitation and viability of spermatooza (Ranchil et al, 2009; Tayyem et al, 2006; Lee et al, 2014 ). All these changes in sperm parameters suggested that C. longa treatment could have directly suppressed the activities of gonadotropins and testosterone through hypothalamahypophyseal gonadal axis or might have indirectly affected the testicular function (Jenett et al., 2009).

**Conclusion:**
Thus it can be concluded that the Curcuma longa show antifertility effects in male mice and this can be used as one oral contraceptive agents for fertility control among humans.

**References:**