BIOCHEMICAL AND HISTOLOGICAL STUDY OF SPERMATOGENIC ACTIVITY IN MALE ALBINO RATS TREATED WITH CANTHARIS Q

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ABSTRACT : Cantharidin is a bioactive toxin produced by the blister beetles commonly called Spanish fly. This natural compound is a bicyclic monoterpene (C_{10}H_{12}O_{4}) that has clinical application as an anti-inflammatory, antiviral as well as anti-tumor agent and has been widely used to treat a variety of skin-related diseases. There are several reports of consumption of dried blister beetles and their traditional formulations due to a long history of the supposed aphrodisiac property of cantharidin. The present study, therefore, aimed at investigating the biochemical and histological changes in the testes of male albino rats of Wistar strain due to oral intake of Cantharis Q, a crude alcoholic extract of blister beetle *Lytta vesicatoria* used as mother tincture and as diluted potentized form in homeopathy. The experimental rats were given Cantharis Q dosage of 500 µg/Kg body weight for 60 days and the subsequent autorecovery was also studied after 30 days without treatment. The treated rats showed a significant decrease in the weight of testis, seminiferous tubular diameter and sperm count. Activity of testicular acid phosphatase (ACP), alkaline phosphatase (ALP), hyaluronidase (HL) enzyme and content of cholesterol, total protein, DNA and RNA decreased significantly whereas activity of beta-glucuronidase (BG) enzyme and glycogen was significantly increased. Spermatogenesis stages VIII, IX and X showed sloughing of round spermatids into the tubular lumen. The animals kept for autorecovery showed only partial improvement. Thus, it could be concluded that the treatment had a negative impact on the physiological function of testis of albino rat causing detrimental effects on the spermatogenic activity.

Key words : Cantharidin, Cantharis Q, blister beetles, aphrodisiac, spermatogenesis.


INTRODUCTION

Family Meloidae of Order Coleoptera includes blister beetles, which are known to actively produce cantharidin, a toxic bicyclic monoterpene (C_{10}H_{12}O_{4}) that has a defensive function. It is released externally by reflex bleeding and is also stored in large quantities in the male accessory glands. These glands are involved in the transfer of terpene from males to females, which receive cantharidin via spermatophores as a nuptial gift to be used for their own protection and that of the eggs. Historically, blister beetles’ dried bodies are utilized in Chinese traditional medicines to treat different medical disorders (Wang, 1989). It is available as mother tincture, Cantharis Q, which is also used in its potentized form in homeopathy for treatment of many disorders such as baldness, rheumatism, burning and cystitis, kidney and genital disorders (Ellingwood, 1919). Cantharidin also has a long, infamous reputation for being an aphrodisiac, which is based on the observation of pelvic congestion in women and priapism in men after its ingestion (Moed et al, 2001). It is known to be consumed to treat erectile dysfunction (Wang, 1989; Liu and Chen, 2009). However, the oral intake with this intention is what is often associated severe or fatal poisoning (Karras et al, 1996). Ellenhorn (1997) has mentioned the use of cantharidin producing beetles ground into a powder, in a medicine called *selesta* taken as an aphrodisiac by the Tswanas in South Africa and there have been fatalities reported due to its toxic effect when taken orally. The cantharidin is used as a formulation in the form of crude alcoholic extract of these blister beetles such as *Lytta vesicatoria* commonly called Spanish fly. It is available as mother tincture, Cantharis Q, which is also used in its potentized form in homeopathy for treatment of many disorders such as baldness, rheumatism, burning and cystitis, kidney and genital disorders (Ellingwood, 1919). Cantharidin also has a long, infamous reputation for being an aphrodisiac, which is based on the observation of pelvic congestion in women and priapism in men after its ingestion (Moed et al, 2001). It is known to be consumed to treat erectile dysfunction (Wang, 1989; Liu and Chen, 2009). However, the oral intake with this intention is what is often associated severe or fatal poisoning (Karras et al, 1996). Ellenhorn (1997) has mentioned the use of cantharidin producing beetles ground into a powder, in a medicine called *selesta* taken as an aphrodisiac by the Tswanas in South Africa and there have been fatalities reported due to its toxic effect when taken orally. The...
specialization, plays a role in spermatid adhesion and that testosterone has a role in regulating this association of round spermatids (Russell, 1977; Grove and Vogl, 1989; Grove et al., 1990) as well as in orientation of the spermatid toward the basement membrane (Russell et al., 1988). Sloughing of spermatids seen in the tubular lumen for the treated as well as recovery animals therefore, indicated the decreased production of testosterone by the Leydig cells. Decreased area occupied by these cells as seen in the sections of testis of treated rats (Fig. 1C, D and Fig. 4 D) further confirmed this.

**CONCLUSION**

It could be concluded from this experimental study that the oral intake of Cantharis Q dosage of 500 μg/kg for the duration of 60 days, which is equivalent to the duration of the spermatogenic cycle caused interference with the normal spermatogenesis process. The light microscopic studies revealed decrease in the diameter of seminiferous tubules and accumulation of debris of round spermatids in their lumen explaining impaired spermatogenesis which correlated with the results obtained by biochemical assays of the testis-specific analytical parameters and marker enzymes. It was further observed that the withdrawal of the treatment for 30 days after such a chronic treatment did not bring about a significant recovery in this experimental group.

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**REFERENCES**


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**Table 2**: Effect of Cantharis Q treatment on weight of testis, seminiferous tubule diameter epididymal sperm count, and frequency of various spermatogenic stages of male albino rat after treatment of 60 days duration and after 30 days of autorecovery period compared with their respective control groups.

<table>
<thead>
<tr>
<th>Parameters assessed</th>
<th>Treatment period of 60 days</th>
<th>Autorecovery of 30 days</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treated</td>
</tr>
<tr>
<td>Organ weight (mg/gm b.w.)</td>
<td>4.278 ± 0.068</td>
<td>3.96 ± 0.051*</td>
</tr>
<tr>
<td>Seminiferous tubule diameter (mm)</td>
<td>0.278 ± 0.024</td>
<td>0.259 ± 0.02*</td>
</tr>
<tr>
<td>Epididymal sperm count (10⁶ / cauda)</td>
<td>104.6 ± 5.128</td>
<td>79.4 ± 7.635*</td>
</tr>
<tr>
<td>Frequency of stages I-V (%)</td>
<td>15.8 ± 0.447</td>
<td>21.4 ± 1.517*</td>
</tr>
<tr>
<td>Frequency of stages VI-VII (%)</td>
<td>16.4 ± 0.548</td>
<td>14.8 ± 2.049</td>
</tr>
<tr>
<td>Frequency of stage VIII (%)</td>
<td>25.4 ± 0.548</td>
<td>26.8 ± 1.643</td>
</tr>
<tr>
<td>Frequency of stage IX (%)</td>
<td>9.2 ± 1.095</td>
<td>7.4 ± 0.548</td>
</tr>
<tr>
<td>Frequency of stages X-XII (%)</td>
<td>12 ± 4</td>
<td>13.4 ± 2.191</td>
</tr>
<tr>
<td>Frequency of stages XIII (%)</td>
<td>12.6 ± 2.510</td>
<td>9.8 ± 1.095</td>
</tr>
<tr>
<td>Frequency of stages XIV (%)</td>
<td>8.6 1.517</td>
<td>6.4 ± 1.517*</td>
</tr>
</tbody>
</table>

The number of animals in each group, n = 5; values are expressed as Mean ± SD. Differences that are significant between the respective control and experimental groups at P<0.05 are marked as *.


Moed L, Shwayder T A and Chang M W (2001) A blistering defense...