Effects of Camel Urine on Serum Testosterone Level in Male Rats of Different Testosterone Levels

Dalia A. Mohamed, Nabiela M. El Bagir, Salawa M.E. Khougali and Balgees A. Atta Elmman
Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Postal Code 13314, Khartoum North, Sudan
Department of Biochemistry, Faculty of Veterinary Medicine, University of Khartoum, Khartoum, Sudan
Central Veterinary Research Laboratory, P.O. Box 8067, Al Amarat, Khartoum, Sudan

Abstract: Twenty four adult Wistar albino male rats, weighing 140-200 g were used to evaluate the effect of oral administration of she-camel urine in rats of different testosterone levels. The rats were divided into four groups; high serum testosterone group (HT) and low serum testosterone group (LT), prepared by subcutaneously injection of testosterone enanthate and intraperitoneally injection of lead acetate respectively for 21 days and other two groups (Normal Testosterone (NT) and Control (C)) were used without pre treatments. Then, all groups except the control group were treated daily by an oral dose of 2 mL/100 g body weight of she-camel urine for another 21 days. Rat’s body weight was measured and blood samples were taken, before camel urine treatment and weekly after camel urine to determine the serum levels of testosterone. The results revealed that, camel urine regulated the high and low serum testosterone levels as they returned to their normal values. At the same time, no change on testosterone level was seen in the group of NT. After the 1st 2 weeks of the treatment HT group showed significant decrease in the serum testosterone level from 21.60-14.5 ng mL⁻¹ while LT group appeared significant increase from 2.55-7.28 ng mL⁻¹. In the 3rd week, all treated groups showed significant (p<0.01) increase in testosterone level compared to the previous week. Camel urine treatment also improved the rate of weight growth in rats compared to the pretreated period in HT and LT groups. The study concluded that camel urine can regulate serum testosterone levels and rectify the resulted changes accompanied abnormal hormone levels.

Key words: LT, HT, NT, level, weight

INTRODUCTION

Camels milk and urine proved to have medicinal effects, so Islam encouraged and permitted the drinking of camel milk and camel urine is permitted in case of necessary medical treatment. Urine of one humped camel (Camelus dromedaries) is medically used for centuries in different parts of Arab countries. There are many well known health benefits drawn from camel urine as shown throughout the history of medical science till today as urine has profound medical uses such as effectiveness against allergies, psoriasis and all skin problems. Natalie (2002) reported beneficial effects of urine on fever, burns, tuberculosis and fertility.

According to O'haj (1998) camel urine was reported to be used for the treatment of alopecia and to promote hair growth which indicated that camel urine can influence hormonal changes involved in hair loss. Testosterone conversion to dihydrotestosterone which is a more potent androgen results in miniaturization of hair follicle and change in cyclic phase of hair growth cycle (Pandit et al., 2008). Hormonal problems are one of the hair losses causes (Peter and Nicholas, 2008).

Testosterone is the major hormone that affects fertility in men which is needed to initiate spermatogenesis at puberty and to maintain this process in adults (Waters et al., 2003).

Several studies discussed the effects of natural products like herbs and medicinal plants on testosterone levels (Khaki et al., 2009). But research that concerned with the effects of camel urine on hormones are lacking, so this study is designed to examine the effects of camel urine on the different serum testosterone levels as well as body weight on Wistar albino male rats.

Corresponding Author: Dalia A. Mohamed, Department of Animal Nutrition, Faculty of Animal Production, University of Khartoum, Postal Code 13314, Khartoum North, Sudan
MATERIALS AND METHODS

Experimental animals: Twenty four Wistar albino male rats, weighing 140-200 g were used in this study. They were kept under standard conditions of temperature (23°C) and relative humidity (65%) with a 12 h light and 12 h dark cycle and adequate ventilation in the Central Veterinary Research Laboratories premises at Soba, Khartoum, Sudan. Daily they received a balanced diet and water, ad libitum.

Experimental design: Rats were randomly selected and assigned into four groups each group represented in two replicates (3 rats in each).

Group 1: Untreated rats used as Control (C).

Group 2: Normal Testosterone level rats (NT).

Group 3: Low Testosterone level rats (LT) which were injected intraperitoneally with lead acetate at a dose of 8.0 mg (1.0 mL distilled water/kg body weight/day according to Biswas and Ghosh (2003) for 3 weeks before the start of the experiment.

Group 4: High Testosterone level rats (HT) which were injected subcutaneously with 200 µL of sesame oil containing 1.5 mg of testosterone (Testoviron-Depot-50; Schering, Berlin, Germany) twice per week for 3 weeks before the start of the experiment. According to Brunner et al. (1992); these doses were continued during the rest of the experimental period.

Camel urine treatment: The three groups NT, LT and HT were treated orally by 2 mL/100 g body weight of young she-camel urine daily for 3 weeks (Khoulbi et al., 2009). Camel urine was collected at early morning (at dawn) either by frequent urination or by Tashweel Method (Ohaj, 1998). All rats were weighed weekly throughout the treatment period by sensitive balance to an accuracy of 0.1 g according to Axell et al. (2006).

Blood samples: Blood samples were taken before administration of camel urine and weekly afterwards. All samples were collected in the morning in order to minimize the diurnal variation of hormone levels. The samples were collected in a plain vial and allowed to stand for 3 h and thereafter, centrifuged at 2000 rpm for 10 min to separate serum from the blood clots. Serum obtained from the animals was kept frozen at -20°C until tested for the quantification of serum testosterone.

Hormonal assay: Serum testosterone was measured by Enzyme Linked Immunosorbent Assay (ELISA) Microwell Method described by Rajkowski et al. (1977).

Principle of the assay: Testosterone (antigen) in the sample competes with horseradish peroxidase testosterone (enzyme-labelled antigen) for binding onto the limited number of anti-testosterone (antibody) sites on the microplates (solid phase). After incubation, the bound/free separation was performed by a simple solid-phase washing.

The enzyme substrate (H₂O₂) and the TMB-Substrate (Tetra Methyl Benzidine) were added. After an appropriate time was elapsed for maximum colour development, the enzyme reaction was stopped and the absorbencies were determined. Testosterone concentration in the sample was calculated based on a series of calibrators. The colour intensity is inversely proportional to the testosterone concentration in the sample.

Statistical analysis: The data obtained from this experiment were subjected to Statistical Analysis of Variance (ANOVA) for CRD using computer Software Package Statistix (Version 8) and comparing the significant difference between them (Day and Quinn, 1989).

RESULTS AND DISCUSSION

The effect of she-camel urine on serum testosterone level: The effect of camel urine on three different serum testosterone levels in rats is presented in Table 1. Treatment with camel urine in wistar albino male rats resulted in transient lowering of the testosterone level in HT group, increased the level for two fold in the NT group and increased the testosterone level four fold in the LT group. At day 0 before the camel urine was application, the testosterone level in the HT group was higher significantly (p<0.01) by approximately two fold than the level in the C and NT groups. In the LT group the level was reduced to about 25% of the C group. But the NT group showed serum testosterone level at the same range observed in the C group.

The 7 days after camel urine administration, a highly significant (p<0.01) reduction in the treatment of high testosterone level was observed which was at the same range of the control without significant difference. Also, numerical increase in the low testosterone level was reported compared to day 0 but still the level was significantly (p<0.01) lower than the control group.

After the 2nd week of camel urine treatment there was no significant change in all treated groups compared to the 1st week but a little change was observed in the
LT group serum testosterone, resulted in a level of the same range of the control with no significant difference. At day 21, there was an increase in the serum testosterone level in all groups treated by camel urine compared with the previous week. The level was significantly (p<0.05) higher than day 14 in both HT and NT groups. All groups’ serum testosterone levels were numerically higher than the level in the C group, except in the HT group which showed a significantly (p<0.01) higher level than the C group and it reached the same range observed at day 0.

The effect of she-camel urine on rat’s body weight: The effect of camel urine on the body weight of rats with different testosterone levels is presented in Table 2. The manipulation of testosterone level in Wistar albino rats reduced significantly the growth rate of both high and low T levels but the effect was more significant and pronounced in the LT group. Then, treatment with camel urine improved growth rate especially in the LT group. The NT group was not affected by camel urine treatment when compared to the C group as they maintained similar growth rates. The initial body weight was at the same range with no significant difference between the different groups. At day 0 the animals weights showed significant increase in all groups compared to the initial weight except LT group which it showed significantly (p<0.01) lower weight compared to its initial weight. These findings highlighted that low serum testosterone level reduced the rat’s body weight significantly and the high levels reduced the growth rate of the rats but to lesser extent when both groups compared to the NT group and C group. Treatment of all groups with camel urine for 7 days resulted in similar rate of weight growth about 20 g in each group except the group of low testosterone level which increased by about 40 g. After 14 days the increase of body weight in all groups was not significant with a just higher level in the HT group compared to the previous week. Similar effects were observed at day 21 as all animals maintained similar weights compared to day 14.

The effect of she-camel urine on serum testosterone level: In the present research, high serum testosterone in male rats showed highly significant (p<0.01) lower level after she-camel urine consumption compared to pre-treatment. But this effect was transient, that on day 21 the level of the hormone was raised to nearly the same level showed before camel urine treatment. This may be due to the influence of camel urine components which contain many of saturated and unsaturated fatty acids (Khougl, 2005). The presence of nonesterified fatty acids in the urine can inhibit testosterone synthesis by affecting cholesterol utilization or endogenous concentration as stated previously by Meikle et al. (1989). Similar to this finding was obtained by Meikle et al. (1996) who found that high testosterone concentration in isolated mouse Leydig cells that induced by luteinizing hormone was reduced significantly by oleic acid treatment which inhibit the testosterone synthesis by inhibiting cholesterol esterase activity. Also, Liang and Liao (1992) found that some unsaturated fatty acids like linoleic acid, palmitoleic acid, oleic acid and myristoleic acid are potent inhibitors of 5α-reductase enzyme that convert the testosterone into 5α-dihydrotestosterone. This can explain in part the elevation of testosterone that occurred after the reduction in response to camel urine consumption which suggests the body benefited from some free fatty acids in reducing the high testosterone level to a normal level but other fatty acids may affect 5α-reductase enzyme and cause retained serum testosterone concentration by preventing the conversion of it to dihydrotestosterone.

In NT group, oral she-camel urine administration did not affect serum testosterone till day 21 which showed significantly higher serum testosterone level than the previous weeks. This increase might be due to consumption of camel urine for long period and absorption of urinary testosterone founds in the camel urine which is the endogenous testosterone excreted in the camel urine (Abdel Hadi et al., 1998). Long standing

### Table 1: Effect of she-camel urine on serum testosterone levels (ng/mL)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Day 0</th>
<th>Day 7</th>
<th>Day 14</th>
<th>Day 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT</td>
<td>21.60±3.2²</td>
<td>13.65±2.1³</td>
<td>14.50±2.0⁶</td>
<td>22.95±3.2²</td>
</tr>
<tr>
<td>NT</td>
<td>8.25±0.6⁵</td>
<td>10.20±1.1⁸</td>
<td>9.05±1.7⁶</td>
<td>15.70±6.3⁵</td>
</tr>
<tr>
<td>LT</td>
<td>2.55±3.7⁶</td>
<td>6.05±3.6⁸</td>
<td>7.28±2.2⁶</td>
<td>12.13±4.9⁶</td>
</tr>
<tr>
<td>C</td>
<td>9.17±0.9⁸</td>
<td>11.25±6.6⁹</td>
<td>10.65±7.4⁶</td>
<td>9.07±5.6⁶</td>
</tr>
</tbody>
</table>

Means±SD within the same row followed by different capital letters are significantly different. Means within the same column followed by different small letters are significantly different.

### Table 2: Effect of she-camel urine on rat’s body weight (g)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Initial body weight</th>
<th>Day 0</th>
<th>Day 7</th>
<th>Day 14</th>
<th>Day 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT</td>
<td>177.50±2.89⁶</td>
<td>181.00±22.0²⁸</td>
<td>202.50±23.45⁶²</td>
<td>212.00±9.09⁶²</td>
<td>219.25±8.69⁶²</td>
</tr>
<tr>
<td>NT</td>
<td>168.75±7.50⁶</td>
<td>208.75±13.7⁷</td>
<td>228.50±8.06⁶⁶</td>
<td>229.25±10.05⁶⁶</td>
<td>226.00±12.81⁶⁶</td>
</tr>
<tr>
<td>LT</td>
<td>176.25±12.50⁶</td>
<td>137.00±6.27⁶⁹</td>
<td>178.25±17.74⁶⁴</td>
<td>179.50±49.05⁶⁴</td>
<td>181.75±21.33⁶⁴</td>
</tr>
<tr>
<td>C</td>
<td>172.50±20.31⁶</td>
<td>206.25±5.50⁶⁸</td>
<td>224.50±10.21⁶⁵</td>
<td>231.75±2.06⁶⁸</td>
<td>232.00±2.16⁶⁸</td>
</tr>
</tbody>
</table>

Means±SD within the same row followed by different capital letters are significantly different. Means within the same column followed by different small letters are significantly different.
to urine may affect the physiological capacity and the level of absorption by endothelial cells (Rang et al., 1995) and this leads to absorption of large quantity of chemically active substances of urine which probably leads to accumulative effects (Khoughi et al., 2009).

She-camel urine administration to adult male rats with low serum testosterone level caused gradual increase in the serum testosterone until it reached the same range of the C group. This could be referred to the use of the camel urine which can reduce the oxidative stress, induced by lead acetate, due to its content of uric acid and creatinine which are known as potent antioxidants (Ames et al., 1981; Glazer, 1988). This finding agree also with the suggestion of Khoughi et al. (2009) that the camel urine may have an active component which could play an important role as an endogenous antioxidant, also may act as cyto-protective agent against tissue damage mediated by toxic substances. Beside that camel urine has some healing power (Imam, 2006) which might repaired the damages on the cellular components of testis tissues. There are no available published data concerning the effect of camel urine on rats when high serum testosterone level but Rubio et al. (2006) studied the role of Lepidium meyenii (Maca) in reversing the lead acetate induced damage on reproductive function in male rats and found that testosterone level was higher in the group of rats treated with Lead acetate plus Maca than that treated with Lead acetate alone. Also, Tribulus alatus extracts in male rats showed significant increase in the free serum testosterone when compared to control (El-Tantawy et al., 2007). Serum testosterone level also was increased by one of the medical herbas called ginger which is a strong anti-oxidant substance and may prevent generation of free radicals (Khaki et al., 2009).

**The effect of she-camel urine on rats' body weight:** In the present research un normal growth rate were seen in comparison to C group when high serum testosterone level was achieved in rats. This agrees with Bing et al. (1998) who found that body weight of rats treated by high doses of testosterone for 8 weeks was significantly lower than that of control. Also, Gray et al. (1979) reported that in male rats given high doses of testosterone, body weight gain was reduced by direct effects on adipose tissue metabolism. After camel urine treatment in the present research the body weight began to increase normally by the same growth rate observed in the control group, this may be due to the positive effect of camel urine on the rats feed intake and nutrient absorption in addition to the decrease in the testosterone level in this group.

Body weight of rats with normal testosterone level was insignificantly different from the C group before and after camel urine administration. The growth rate was increased significantly during the experiment period as normal increasing due to the normal growth as compared to the C group.

Rat’s body weight in the group of low serum testosterone level showed significantly lower value when compared to the C group. Also the decrease from the initial body weight was great from 176.25-137.00 g. Similar observations were found by El-Nekeety et al. (2009) who stated that lead acetate significantly decreased the feed intake and consequently the body weight gain with significant decrease in the serum testosterone. Also, Kang et al. (2004) reported that testosterone level and the mean body weight of the animals treated with lead acetate was significantly lower than that of the other groups.

After camel urine administration, in the present study, the decreasing of the body weight in LT group was stopped and replaced by significant increasing after only 7 days of camel urine treatment, this was accompanied by enhanced feed intake which indicated a restored, good, food absorption and metabolism by feeding she-camel urine which was interrupted by lead acetate application. Marchlewicz et al. (2007) concluded that reduction of body weight might be due to the interruption in absorption and metabolism of feed nutrients essential for health.

**CONCLUSION**

Daily oral administration of she-camel urine for 3 weeks resulted in transient lowering of the high testosterone level, gradual increase in the low testosterone level while the group of the normal level was not affected by camel urine administration.

**REFERENCES**


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