Corticosterone interferes with seasonal recrudescence of germinal bed activity in lizard, *Mabuya carinata*

B S Nijagal & H N Yajurvedi*

Department of Studies in Zoology, University of Mysore, Manasagangotri, Mysore 570 006, India

Received 4 June 1998; revised 10 December 1998

Intraperitonial administration of corticosterone 1 mg or 40 mg/lizard on alternate day for 30 days during recrudescence phase of the cycle resulted in a significant reduction in number of oogonia in germinal bed of *M carinata* ovary. In addition, a significant decrease in number of primordial follicles was observed in 40 mg corticosterone treated lizards. The results indicate that, corticosterone interferes with seasonal recrudescence in germinal bed activity by inhibiting oogonial multiplication and folliculogenesis at higher dose level.

Majority of reptiles exhibit cyclicity in ovarian activity. Recrudescence in ovarian activity shown by activation of germinal bed and growth of follicles is an important event in the seasonal ovarian cycle, that ultimately, leads to the formation of mature oocytes and ovulation. Any factor that interferes with this process may affect gametogenic activity and inhibition of seasonal breeding. Stress induced activation of adrenocortical activity is known to affect gonadal functions in different groups of vertebrates. Increase in blood levels of corticosterone either due to stress or exogenous administration alters gonadal functions in reptiles. However, it is not known whether corticosterone affects germinal bed activity in reptiles. The present study has been undertaken to find out the effect of corticosterone on the number of oogonia, oocytes, and primordial follicles in *M. carinata*.

Adult female *M. carinata* were collected in last week of September and acclimatized to laboratory conditions for a week. They were maintained under normal photothermal conditions and were provided with food (live silk moth) and water *ad libitum*. Lizards were divided into 4 groups of 5 lizards each. The first group of lizards were autopsied before commencement of the experiment which served as initial controls. Each lizard in second group received 0.1 ml vehicle (olive oil). Corticosterone (1 mg/0.1 ml oil/lizard) was administered to each lizard in third group, whereas 40 mg corticosterone/0.1 ml oil/lizard was administered to lizards in fourth group. All injections were given intraperitonially on alternate day for 30 days. Lizards were autopsied 24 hr after last injection. After autopsy weight of the body and ovaries were recorded and converted into weight of ovary (mg)/100g body weight (relative weight of ovaries). Ovaries were fixed in Bouin's fluid, embedded in paraffin, 5 μm thick sections were cut and stained with hematoxylin and eosin. Number of oogonia, oocytes and primordial follicles per ovary were counted from every alternate serial section of ovary. The number of primordial follicles/ovary were counted from every fourth serial section of the ovary. Since there was no significant difference in these parameters of right and left ovary of *M. carinata*, all counts were made from left ovary of each lizard. Data from at least five lizards/group were used to compute group mean and data were analysed using one-way analysis of variance followed by Duncan's new multiple range test (DMRT).

Ovary of *M. carinata* consists of two germinal beds on its dorsal surface. *M. carinata* exhibits cyclic pattern in ovarian activity. Oogonial multiplication and consequent increase in their number and in number of oocytes and primordial follicles are observed during september-october period (unpublished data). In the present study there was no significant variation in mean number of oogonia between controls and initial controls (Table 1) which indicate that laboratory maintainance had no effect on oogonial multiplication. However, administration
Table I—Effect of corticosterone on relative weight of ovary and mean number of oogonia, primary oocytes and primordial follicles of *M. carinata*.

<table>
<thead>
<tr>
<th>Groups and Treatment</th>
<th>Relative weight of ovary (mg/100g body weight)</th>
<th>Oogonia</th>
<th>Primary oocytes</th>
<th>Primordial follicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial controls (1)</td>
<td>298.92 ± 45.93</td>
<td>1106.33 ± 16.35</td>
<td>27.33 ± 3.57</td>
<td>4.66 ± 0.54</td>
</tr>
<tr>
<td>Controls (2)</td>
<td>186.95 ± 28.06</td>
<td>1086.40 ± 60.21</td>
<td>23.48 ± 6.83</td>
<td>6.80 ± 0.95</td>
</tr>
<tr>
<td>Lizards treated with 1μg corticosterone (3)</td>
<td>136.56 ± 3.62</td>
<td>630.66 ± 11.60</td>
<td>12.00 ± 0.94</td>
<td>5.00 ± 1.25</td>
</tr>
<tr>
<td>Lizards treated with 40μg corticosterone (4)</td>
<td>99.26 ± 26.25</td>
<td>500.25 ± 16.32</td>
<td>16.00 ± 1.27</td>
<td>2.00 ± 0.35</td>
</tr>
</tbody>
</table>

ANOVA F value 6.95* 3941.72* 0.13 4.54*

Results of Duncan’s new multiple range test (DMRT) 1 Vs 2 = NS 1 Vs 3 = S 1 Vs 3 = NS 1 Vs 2 = NS 1 Vs 3 = S 1 Vs 3 = NS 1 Vs 4 = S 1 Vs 4 = NS 1 Vs 3 = NS 2 Vs 3 = S 2 Vs 4 = NS 2 Vs 3 = NS 2 Vs 3 = NS 2 Vs 3 = NS 2 Vs 4 = S

*F value is significant (P < 0.05)

...of corticosterone, either 1 or 40 μg, significantly reduced the mean number of oogonia when compared to initial controls as well as controls. Further, higher dose of corticosterone (40 μg) significantly reduced the mean number of primordial follicles when compared to controls. These results indicate inhibition of oogonial multiplication by corticosterone, at both the levels. However, the folliculogenesis is inhibited at higher dose level. There was no significant difference in mean number of oocytes among 4 groups (Table 1). Inhibition of gonadal functions due to corticosteroid administration has been reported in earlier studies in reptiles, for instance, administration of corticosterone results in inhibition of spermatogenesis in *Anolis sagrei*[^6^], reduction in testosterone levels and suppression of aggressive behaviour in *Uta stansburiana*[^7^] and delay in parturition in *Lacerta vivipara*[^8^]. Our findings indicate an inhibitory role of corticosterone on germinal bed activity in *M. carinata*. Since corticosterone is released in higher concentration under stressful conditions, the results suggest that exposure of lizards to stressors during annual recrudescence impedes ovarian growth.

This work is supported by a grant (SP/SO/C-01/96) from Department of Science and Technology, New Delhi.

References