THE EFFECT OF THYROIDECTOMY ON TOTAL AND DIFFERENTIAL LEUKOCYTE COUNT IN RAT

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Thyroidectomy significantly increased the total leukocyte and neutrophil counts. The thyroidectomized rats were however observed to have significantly lower lymphocyte values. The results suggest that thyroidectomy predisposes rats to infection.

Adeniyi and Olowookorun\(^1\) presented evidence suggesting that thyroidectomy influences the number of circulating erythrocytes in rats. Schmid-Schonbein\(^2\) reported that circulating granulocytes play an important role in microvascular perfusion and organ pathology. Compared with red cells, granulocytes are large, stiff cells that can adhere strongly to the vascular endothelium and this may cause accumulation of granulocytes in the microcirculation and obstruct capillaries and cause cardiovascular complications\(^3\). The analysis of leukocyte kinetics in the circulation during hypothyroidism will help us to understand better the functioning of the cardiovascular system in hypothyroid subjects. This paper is an extension of the author's earlier work on haematological changes observed in thyroidectomized and thyroxine-treated rats.

MATERIALS AND METHODS

Adult male Wistar strain rats weighing 110-140 g were divided into three groups: control, thyroidectomized and thyroidectomized rats treated with thyroxine. Surgical
Rat Thyroidectomy and Leukocyte Count

Thyroidectomy was performed using ether anaesthesia. After the thyroid glands were totally extirpated, the rats were checked to be sure that the external parathyroids were intact. After surgery, rat chow and tap water were provided ad-libitum for a period of 30 days. The rats in the control group were also provided with rat chow and tap water ad-libitum for 30 days. Thyroidectomized rats treated with thyroxine were given thyroxine (6-8 μg/100g body wt/days, A.H. Cox and Co., Barnstaple U. K.), for 30 days. The thyroxine tablets were grinded and administered through the drinking water.

Blood Sampling and Analysis

Rats were anaesthetized with ether, after which heart blood was collected in EDTA anticoagulant, between 8 and 9 a.m. The samples of blood were immediately subjected to standard haematological analysis vide Schalm et al.ª

All results are expressed as means ± standard errors. Statistical comparisons between the various experimental groups were performed using the student's two-tailed test for unpaired data.

RESULTS

The result shows (Table 1.) that the value for total leukocyte count obtained for thyroidectomized rats (0333±22.40 cells/mm³) was significantly (P < 0.001) higher than the values obtained for normal rats (5083±18.3 cells/mm³) and thyroidectomized rats treated with thyroxine (509±21.40 cells/mm³). Table 2 shows the differential leukocyte values of normal, thyroidectomized and thyroidectomized rats treated with thyroxine. The lymphocyte value for the thyroidectomized rats (72.50±0.49%) was significantly (P < 0.001) lower than the values obtained for normal rats (78.75±0.50%) and thyroidectomized rats treated with thyroxine (76.76±0.87%). The neutrophil value for the thyroidectomized rats (27.25±1.07%) was the highest (P < 0.001).

DISCUSSION

The values obtained in this study for total and differential leukocyte count
Table 1—Total Leukocyte Count in normal, Thyroidectomized and Thyroidectomized rats treated with Thyroxine.

<table>
<thead>
<tr>
<th>Types of Adult Rats</th>
<th>Initial Body weight (g)</th>
<th>Final Body weight (g)</th>
<th>Daily water consumption (g)</th>
<th>WBC count (cells/mm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>138.5 ± 4.13</td>
<td>248.1 ± 6.90</td>
<td>372.1 ± 14.07</td>
<td>5083 ± 18.33</td>
</tr>
<tr>
<td>Thyroidectomized rats treated with thyroxine</td>
<td>138.5 ± 5.75</td>
<td>254.2 ± 8.02</td>
<td>373.5 ± 14.02</td>
<td>5091 ± 21.40</td>
</tr>
<tr>
<td>Thyroidectomized</td>
<td>139.5 ± 5.40</td>
<td>22.44 ± 5.11</td>
<td>259.5 ± 19.49</td>
<td>8333 ± 22.40*</td>
</tr>
</tbody>
</table>

Each value represents mean ± S. E. of 10 observations.
*P < 0.001 compared with the value for control rats.

Table 2—Differential Leukocyte Count in Normal, Thyroidectomized and Thyroidectomized Rats treated with Thyroxine

<table>
<thead>
<tr>
<th>Types of Adult Rats</th>
<th>Lymphocyte (%)</th>
<th>Monocyte (%)</th>
<th>Basophil (%)</th>
<th>Neutrophil (%)</th>
<th>Eosinophil (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>78.75 ± 0.50</td>
<td>0.0 ± 0.0</td>
<td>0.25 ± 1</td>
<td>20.50 ± 0.91</td>
<td>0.5 ± 1.4</td>
</tr>
<tr>
<td>Thyroidectomized rats treated with thyroxine</td>
<td>76.76 ± 0.87</td>
<td>1.25 ± 1.69</td>
<td>0.25 ± 1</td>
<td>20.75 ± 1.29</td>
<td>1.25 ± 0.85</td>
</tr>
<tr>
<td>Thyroidectomized</td>
<td>72.50 ± 0.43*</td>
<td>1.25 ± 1.69</td>
<td>0.5 ± 1.4</td>
<td>27.25 ± 1.07</td>
<td>1.25 ± 0.81</td>
</tr>
</tbody>
</table>

Each value represents mean ± S. E. of 10 observations. *P < 0.001 compared with the value for normal rats.
for normal rats were consistent with literature values for this species of animal\(^2\). The result further showed that the values obtained for the group of thyroidectomized rats and treated with thyroxine were identical. This can be interpreted to mean that the dose of thyroxine used was appropriate and was able to forestall the effects of thyroidectomy. It was observed presently that the thyroidectomized rats had significant increase in total leukocyte and neutrophil counts. This group of rats also had significantly lower lymphocyte value. The neutrophilic leukocytosis and the accompanied decline in the numbers of lymphocytes observed in the thyroidectomized rats could be interpreted to mean that thyroidectomized rats are in a state of mobilising all the available resource to combat an imminent infection. It is therefore possible that a fall in thyroid hormone titre predisposes rats to infection. The increased neutrophilic granulocytes in the thyroidectomized rats indicates a possible complication in the function of the cardiovascular system of this set of rats\(^2\).

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REFERENCES