SERUM BIO-CHEMICAL INDICES IN CAPTIVE BONNET MACAQUES (Macaca radiata)

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ABSTRACT

A clinical parameter study was conducted to file the reference serum bio-chemical values of Bonnet macaques (Macaca radiata) reared under captivity. The animals were chemically restrained and six blood samples (3 males and 3 females) were collected from the saphenous vein and processed. In this study, the mean ± S.E. of estimated value of serum biochemical profiles were close to the normal range reported earlier. But, serum glucose level was less and serum level of phosphorus was comparatively high.

Keywords: Bonnet macaques- Captivity - Serum biochemistry

INTRODUCTION

Non-human primates are wide spread in India and are more popular among the captive wild animals due to their active movements. However, the health and disease related information in both captive and feral non-human primates is still in a stage of infancy in India. Research about the biology, health or disease of non-human primates are rarely carried out in these unique and attractive species. Hence, this study was carried out in order to establish a base-line biochemical data. Champoux et al., (1996) reported that the clinical biochemistry measures were commonly utilized as indicators of the health status of non-human primates. The data collected will help towards monitoring the health status under captive conditions. Thus, the present study describes the bio-chemical values of captive Bonnet macaques in India.

MATERIALS AND METHODS

Blood samples were collected from saphenous vein of captive six (3 males and 3 females) adult Bonnet macaques maintained at Arignar Anna Zoological Park, Vandalur, Chennai, Tamilnadu, by the process as suggested by Wallach and Boever (1983); Fowler (1986) and Venkatesan et al. (2006).

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Restraint of the animals was carried out with ketamine hydrochloride and xylazine hydrochloride at the dose rate of 10 mg/kg and 1 mg/kg body weight respectively. Blood samples were subsequently drawn to plain vacutainer tubes for assessment of the serum bio-chemical profile. Serum was separated by centrifugation at 2000 rpm for 10 minutes and the serum was stored at – 20°C, until further processing.

Blood urea nitrogen (BUN) was estimated by glutamate dehydrogenase (GLDH) method and was expressed as mg/dl. Creatinine was estimated by modified Jaffe’s method and was given as mg/dl. Total protein was estimated by Direct Biuret method and expressed as g/dl. Albumin was estimated by Bromocresol green methodology and was given as g/dl. Total and direct bilirubin was estimated by modified dimethyl sulfoxide (DMSO) method and were expressed as mg/dl. Total cholesterol was estimated by CHOD-PAP method and the values were expressed as mg/dl. Calcium was estimated by modified ortho-cresolphthalein complex (OCPC) method and was expressed as mg/dl. Phosphorous was estimated by phosphomolybdate method and was expressed as mg/dl. Fasting serum glucose was estimated with test stripe II using the Glucocard (Accurex Biomedical Ltd.) and was expressed as mg/dl.

AST and ALT were estimated by IFCC recommended procedure and were expressed as U/L. Alkaline phosphatase (ALP) was estimated by DGKC – SCE recommended procedure and was expressed as U/L.

RESULTS AND DISCUSSION

The mean ± S.E. values for blood metabolic profile like serum total protein, albumin, globulin, A/G ratio, serum glucose, serum cholesterol, calcium and phosphorus were given in Table. 1. The mean ± S.E. values for organ function profile (like BUN, creatinine, total bilirubin, direct bilirubin, indirect bilirubin) and serum enzyme profile (like AST/SGOT, ALT/SGPT and ALP) were given in Table. 2. The values reported for these parameters in Bonnet macaques under study were in close range to the data furnished by Ramachandra et al., (1998) and Venkatesan et al., (2006). The mean ± S.E. of serum glucose level estimated in this study for Bonnet macaques was 75.50 ± 7.23 mg/dl (Table 1). In this regard, it becomes significant to quote that fasting serum glucose concentration was normally lower in macaques (40-80 mg/dl) than in other common laboratory animals, as reported by Hall and Everds (2003). Further, it revealed that macaques with notably high concentrations (more than 150mg/dl) of fasting serum glucose concentration should be given significant clinical importance because a small percentage of macaques had diabetes mellitus similar to human type II diabetes and diabetic macaques often may have very high serum triglycerides concentration.

The serum level of phosphorus in Bonnet macaques were 5.53 ± 0.63 mg per cent. These values were higher than the ones obtained by Ramachandra et al., (1998). The differences in plane of nutrition and metabolism might be attributed to such variations seen during this study. The literatures pertaining to estimation of direct and indirect bilirubin in non-human primates were 0.05 ± 0.01 and 0.11 ± 0.02, respectively which is found to be less.

The overall parameters failed to reveal any significant variations between sexes among the macaques under study. This was in
agreement with the findings of Ramachandra et al., (1998). Further, it was quoted that the blood biochemistry of the Bonnet monkeys were similar to man and Rhesus macaques and levels were hence comparable among these species. Similarly, the differences in feeding habits, metabolism and species specific factors might be attributed to the occurrence of overall variations in values quoted between the species of non-human primates under study and other non-human primate species.

The non-human primates need to be subjected to blood collection techniques in a periodical manner in zoological parks, zoos or zoological gardens. In addition to technical information pertaining to the existing health status, clinical problems like anaemic status, haemo-protozoal diseases etc. can be detected by the examination of these samples.

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REFERENCES


### Table - 1
Blood Biochemical Profile (Mean ± Standard Error)

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total protein (g/dl)</th>
<th>Albumin (g/dl)</th>
<th>Globulin (g/dl)</th>
<th>A/G ratio</th>
<th>Serum glucose (mg/dl)</th>
<th>Serum cholesterol (mg/dl)</th>
<th>Calcium (mg/dl)</th>
<th>Phosphorus (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonnet macaques (n = 6)</td>
<td>7.33 ± 0.21</td>
<td>3.60 ± 0.28</td>
<td>3.74 ± 0.39</td>
<td>1.07 ± 0.21</td>
<td>75.50 ± 7.23</td>
<td>112.54 ± 8.19</td>
<td>10.77 ± 1.12</td>
<td>5.53 ± 0.63</td>
</tr>
</tbody>
</table>

### Table - 2
Organ Function Profile and Serum Enzyme Profile (Mean ± Standard Error)

<table>
<thead>
<tr>
<th>Groups</th>
<th>BUN (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
<th>Total Bilirubin (mg/dl)</th>
<th>Direct Bilirubin (mg/dl)</th>
<th>Indirect Bilirubin (mg/dl)</th>
<th>AST/SGOT (IU/I)</th>
<th>ALT/SGPT (IU/I)</th>
<th>ALP (IU/I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonnet macaques (n = 6)</td>
<td>30.30 ± 3.83</td>
<td>0.76 ± 0.16</td>
<td>0.16 ± 0.02</td>
<td>0.05 ± 0.01</td>
<td>0.11 ± 0.02</td>
<td>40.24 ± 4.94</td>
<td>21.16 ± 6.29</td>
<td>942.88 ± 85.25</td>
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</tbody>
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