The Fructose and Citric Acid Content in the Male Accessory Glands of Reproduction of the Rats Administered with Psidium Root

By

C. Chang and M. T. Peng

From the Department of Physiology, Medical College, National Taiwan University, Taipei, Formosa, China

(Received for publication, October 7, 1954)

Mann and his coworkers established fructose and citric acid as secretory products of certain accessory glands of reproduction in several mammalian species; in rats the fructose was found in the coagulating gland and dorsolateral prostate, and citric acid in the seminal vesicle and ventral prostate. Further it was demonstrated that the secretion of fructose and citric acid depended upon and was regulated by the male sex hormone. Thus the 'fructose test' was described and developed as an indicator of male sex hormone activity.

One of the authors reported that administration of Psidium root extract caused diestrus in female and involution of the accessory organs of reproduction in male rats. From the histological findings of the male accessory organs of reproduction and the anterior hypophysis, decreased secretion of sex hormone was suggested.

In order to insight the androgenic activity of the rats injected with extract of root of Psidium guajava from the chemical standpoint, fructose and citric acid content of the male accessory organs of reproduction were determined.

Experimental

Material and Methods

Rats of the same weight and same age were divided into two groups; one group was administered with water extract of root of Psidium guajava (30 days' oral administration or 10 days' subcutaneous injection), and another served as control. Following the last day of administration, the rats were killed under ether anesthesia in order to prevent ejaculation and loss of secretory fluid from the accessory organs of reproduction and the organs were analyzed together with the secretion contained in them. To
ensure uniformity the dissection of organs was performed by one person. Immediately after the dissection and weighing, the organs were ground with trichloracetic acid (10%) and protein-free extracts were obtained by centrifugation. The coagulating gland and dorsolateral prostate provided the material for fructose analysis and the seminal vesicle and ventral prostate were used for citric acid estimation. Fructose was determined by the method of Roe\(^6\)) and citric acid by the method of Natelson\(^7\)).

**Results**

*Oral administration.* After 30 days' administration in a daily dose of 0.3–0.6 gr. per animal, neither the weights nor the fructose content of dorsolateral prostate and coagulating gland differed very much from the control (Table I).

*Subcutaneous injection.* After 10 days' injection in a daily dose of 15 mg. per animal the fructose content of dorsolateral prostate and coagulating gland in unit weight as well as in total gland decreased, although the weight of prostate did not decrease very much (Table I). By a daily injection of 30 mg., the difference was more prominent (Table I). After 10 days' injection in a daily dose of 30 mg., the citric acid content in the seminal vesicle decreased (Table II). Although the citric acid level in the ventral prostate was almost the same with the control animal, the total citric acid content in the accessory organs of reproduction was low in the injected animals.

**Discussion**

Mann and his coworkers\(^4\) described the 'fructose test'; it is based on the findings that testicular hormone activity is reflected in most sensitive manner in the capacity of the accessory organs to produce fructose and that therefore the actual level of fructose in the accessory organs of reproduction provides an accurate indicator of endocrine testicular function.

The results of chemical analysis of fructose and citric acid in the accessory organs of reproduction of the rats given Psidium root coincided with the gross measurement (weight and size) and histological appearance\(^5\). Although the weight of dorsolateral prostate did not decrease very much by a daily injection of 15 mg. for 10 days, its fructose level decreased considerably. In this respect the chemical analysis seems to be more sensitive than the gross examination. Decrease of fructose level seems to be more marked than that of citric acid, although we did not estimate them in the same animal.

**Conclusion**

The fructose content of dorsolateral prostate and coagulating gland/
### Table I

Fructose Content of the Dorsolateral Prostate and Coagulating Gland of Rat administered with Psidium Root Extract

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/day)</th>
<th>Ages (months)</th>
<th>Body weight (gm)</th>
<th>Dorsolateral prostate</th>
<th>Coagulating gland</th>
<th>Organ weights (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral administration group</td>
<td>300</td>
<td>3 4-5</td>
<td>127.7</td>
<td>412.1</td>
<td>37.76</td>
<td>191.07</td>
</tr>
<tr>
<td>Treated group</td>
<td>600</td>
<td>4 4-5</td>
<td>127.3</td>
<td>211.0</td>
<td>37.06</td>
<td>78.74</td>
</tr>
<tr>
<td>Subcutaneous injection</td>
<td>15</td>
<td>3 8-9</td>
<td>316.7</td>
<td>427.0</td>
<td>36.11</td>
<td>148.82</td>
</tr>
<tr>
<td>Treated group</td>
<td>30</td>
<td>5 8</td>
<td>276.4</td>
<td>335.9</td>
<td>30.94</td>
<td>104.53</td>
</tr>
</tbody>
</table>

### Table II

Citric Acid Content of the Seminal Vesicle and Ventral Prostate of Rat injected with Psidium Root Extract subcutaneously

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/day)</th>
<th>Ages (months)</th>
<th>Body weight (gm)</th>
<th>Seminal vesicle</th>
<th>Ventral prostate</th>
<th>Organ weights (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>4 9-10</td>
<td>250.0</td>
<td>1052.9</td>
<td>422.1</td>
<td>47.43</td>
<td>2394.0</td>
</tr>
<tr>
<td>Treated group</td>
<td>30</td>
<td>9-10</td>
<td>247.3</td>
<td>632.9</td>
<td>364.0</td>
<td>50.21</td>
</tr>
</tbody>
</table>
and the citric acid level of seminal vesicle are lower in the male rat injected with the root of Psidium guajava L. than in the control.

References

5) Peng, Lee & Lim,