ROLE OF DENTOGINGIVAL SPLINTER OF ACRYLIC RESIN FOR THE INCREASE OF LACTOBACILLUS IN THE MOUTH

BY

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Oni$1$ and Kondo$1$ found that the increase of oral Lactobacilli is caused by wearing small splinter like plate in a mouth. They assumed that carbohydrate food stuffs retained under the plate and anaerobic environment established under the plate will favor for the growth of this organism. The present report was made for fulfillment of this assumption.

Numbers of sugar in food or in saliva would be most stimulative nutrient for lactic acid fermenters. But these substance contains not only sugars, but also several kinds of protein and its derivatives from which salival ammonia might be split through deamination by some oral bacteria. Kesel et all$2$ reported that ammonia in saliva reduced Lactobacillus count in the mouth. Yoshino$3$ found that more than half of Streptococcus salivarius strains isolated showed ureolytic activity.

METHODS

After cleaning a mouth by brushing tooth and gargling, mouth wash quantitatively prepared by peptone water was collected in a large test tube and number of Lactobacilli in it was estimated on the selective medium by Oni$1$ and Kondo$1$ as the initial population. After certain period of time, 2nd estimation of Lactobacillus population was made by mouth washing. The rate of increase during this time was then determined. The rate of increase under various conditions was determined to compare each other. The conditionings were introduced into the mouth in three ways, a small dentogingival splinter shown in our early report$1$), filled with 5 g. acetyl cellulose paste, 25 mg. glucose in 5 g. acetyl cellulose paste or about 5 ml. of 20% gelatin solution. The splinter itself was made of acrylic resin individually.

Ten measurements at one condition were repeated during five consecutive

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Table 1. Rate of increase of Lactobacilli in various environments in a mouth

<table>
<thead>
<tr>
<th>Patient</th>
<th>Without splinter for 3 hrs</th>
<th>Gelatin for 3 hrs</th>
<th>Acetyl cellulose for 3 hrs</th>
<th>Acetyl cellulose and glucose for 1, 2, 3, and 4 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.91</td>
<td>2.27</td>
<td>3.62</td>
<td>3.71, 40.58, 41.13, 49.78</td>
</tr>
<tr>
<td>2</td>
<td>3.01</td>
<td>14.21</td>
<td>1.86</td>
<td>14.04, 12.12, 7.03, 9.98</td>
</tr>
<tr>
<td>3</td>
<td>1.14</td>
<td>3.14</td>
<td>3.89</td>
<td>6.71, 5.29, 49.20, 8.13</td>
</tr>
<tr>
<td>4</td>
<td>1.17</td>
<td>16.27</td>
<td>3.56</td>
<td>4.40, 20.00, 12.88, 15.00</td>
</tr>
<tr>
<td>5</td>
<td>0.87</td>
<td>15.10</td>
<td>22.80</td>
<td>14.47, 21.70, 75.70, 2.16</td>
</tr>
<tr>
<td>6</td>
<td>0.92</td>
<td>2.47</td>
<td>4.12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.22</td>
<td>2.08</td>
<td>5.37</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1.25</td>
<td>1.33</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>4.68</td>
<td>4.41</td>
<td>14.60</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.25</td>
<td>1.87</td>
<td>5.17</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>1.43</td>
<td>6.31</td>
<td>6.57</td>
<td>8.67, 19.94, 22.74, 17.01</td>
</tr>
</tbody>
</table>

days and then averaged.

Results

Whole results obtained are summarized in Table 1. The rate of increase of Lactobacilli within 3 hrs in the mouth without splinter counted 1.43. Application of glucose and acetyl cellulose increased the same rate to 22.74 during the same period. Acetyl cellulose paste and gelatin solution also increased the rate to 6.57 and 6.31 respectively. Statistical analysis of them proved that each increases of Lactobacilli after conditioning are significant at 5% level, but difference between conditioned cases with glucose and without glucose is less significant than 5% but more than 10%.

Application of glucose raised Lactobacillus count to 3.67, 19.94 and 17.01 times during one, two and four hrs respectively. Fig. 1 illustrates the intraoral growth curve of Lactobacilli when small amount of glucose was placed under the splinter.

Discussion

Acetyl cellulose is a substance to make colloidal solution in water but resistant against enzymatic attack of oral bacteria. This substance is thus supposed to close the room under the splinter from surrounding and to stop the salival flood to supply oxygen and other nutrients therein. The fact that Lactobacilli raised their population under such condition may suggest the presumption that some nutrient, probably carbohydrate, may be supplied from
gingival crevices or interepithelial spaces of gingival mucosa.

Another fact that effect of gelatin application was almost as same as that of acetyl cellulose also indicates that the environmental change by gelatin was nothing more than that of acetyl cellulose and did not cause multiplication of proteolytic oral flora which release NH₃. Onishi⁴) found that when peptone broth was incubated with dental scraping, the fusiform organisms became dominant. The addition of glucose to the broth promoted an increase in the Streptococcus population. Onishi, Kondo, Katayama and Uchiyama⁵) found that Streptococcus count always parallel with Lactobacillus population in the mouth. Kraus⁶) expressed this relation in other term, in-

![Graph](image)

Fig. 1. Growth curve of Lactobacilli under the splinter, when glucose was placed there.


individual constancy of Streptococcus Lactobacillus ratio. The similar relation that when whole saliva was incubated, the lactobacilli, streptococci and veillonella decreased with time was also reported by Shiota and Kunkel.\(^7\) The present results and all of these findings make the following deduction possible that Lactobacilli can not multiply under the splinter, unless utilizable carbohydrate is supplied.

**Summary**

When dentogingival area was covered with small splinter, Lactobacillus always increased. It is highly possible that the splinter would trap leaked carbohydrate which exert promoting effect on the increase of Lactobacillus population. Addition of glucose under the splinter introduced marked increase of this organism. But this effect reduced with time according to the consumption of the glucose. Gelatin had no action to reduce the Lactobacillus count under this condition.

**References**
