EVALUATION OF TOTAL UNSTIMULATED SALIVA VISCOSITY IN COMPLETE EDENTULOUS PATIENTS

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Abstract: Purpose: Clinical and laboratory assessment of total unstimulated saliva viscosity in order to evaluate the quality of saliva in edentulous patients wearing complete dentures. Materials and methods: A number of eighty patients, of both sexes participated in the investigation: a control group, 40 patients aged 25-60 years, and a test group, 40 patients aged 45-75 years, edentulous patients treated with acrylic dentures. Clinical method used: Saliva collection was done from the floor of the oral cavity using a dental mirror. With the dental forceps salivary try forming a filament. Laboratory method used: Viscosity determination was made using saliva viscometer type Brookfield digital cone-plate. Results: Compared to the average values from literature, from the control group observed a change in salivary viscosity in 6 patients, 5 of them suffer from various general diseases. In the test group, shows the modified salivary viscosity 25 of 33 patients suffering from various general conditions. Modification of salivary viscosity on the remaining 8 patients could be attributed to wearing acrylic dentures because they do not suffer from any illness, is generally not found in any drug treatment and wear dentures over five years, while the remaining 7 healthy patients does not have these changes because of shortly wearing. Conclusions: The laboratory test method results correlate with clinical test results for determining the viscosity of saliva. In these tests it is found that the viscosity is changed in both groups (control and test). These changes in salivary viscosity may be attributed to general diseases and medications. For the entire test group we observed an increase in salivary viscosity including those who apparently do not present any general disease, these changes can be caused by wearing complete acrylic dentures, which change the temperature and pressure inside the space between the denture and the surface support.

INTRODUCTION

One of the deciding factors in maintaining complete dentures is the viscosity of saliva. In practice a significant number of patients treated with acrylic complete dentures show poor maintenance due to the qualitative changes of salivary fluid [1,2,4]

Purpose: Clinical and laboratory assessment of total unstimulated saliva viscosity in order to evaluate the quality of saliva in
MATERIALS AND METHODS

A number of eighty patients, of both sexes participated in the investigation.

- A control group consisted of 40 patients aged 25-60 years, patients unworn removable dentures
- A test group consisting of patients aged 45-75 years, edentulous patients treated with acrylic dentures with seniority ranging between one month and 20 years

Clinical method used:

The collection of saliva was done from the floor of the oral cavity using a dental mirror. With the dental forceps salivary try forming a filament.

Interpretation:

- State 1 - if the filament is not formed, the saliva is more serous and will not give good adhesion;
- State 2 - if the filament is thin, saliva is mixed and it becomes a film good enough saliva;
- State 3 - if filament is thick, elongated the saliva secretion is more mucous preventing good adhesion.

Laboratory method used:

Viscosity determination was made using saliva viscometer type Brookfield digital cone-plate zone from the laboratory of Physiology and of the Faculty of General Medicine, University "Ovidius" Constanta.

The advantages of this viscometer are:

- Easy handling,
- Direct display of the value of viscosity,
- Does not require special cleaning and storage of saliva.

The unstimulated saliva was collected, following next rules:

- The patients must not consume alcohol, tobacco, spices, carbonated liquid, citrus with 24-48 hours before;
- The collection was performed between 9 and 10 am;
- Last meeting of oral hygiene of dentures was performed 1-2 hours before testing;
- Collection were performed in the same room, well ventilated, with moderate light, patients were asked to rest well before the meeting, during harvesting have created conditions for good mental and physical relaxation;
- Collection was done in sterile test tubes, graduated, 0.5 ml of saliva for each patient.
- The patient is asked to rinse his mouth with cold water, then shut up and do not swallow the saliva accumulated, and with a sterile probe saliva to accumulate in the tube.

Samples are processed immediately with digital type viscometer Brookfield cone-plate zone, as follows:

- Viscometer mounts (container, time);
- Contact the container is made using two hose with a constant temperature water bath, we have set for 37°C;
- Viscometer connects to a 220V power source;
- Viscometer starts and wait until it makes its self-test;
- Remove the container in which the saliva sample will be collected;
- Fit the container, spindle speed is fixed and is given the command to calculate the viscosity;
Results are displayed on the screen. We worked with a spindle dimension of 40 mm. and speeds: 0.3, 0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 10, 12, 20, 30, 50, 60 and 100 rad/sec. Among the results, we chose up to 100 rad/sec, which correlates with the mean viscosity of 1.1-1.32 literature [4].

RESULTS OF THE CLINICAL METHOD

Test results of clinical evaluation of salivary viscosity are presented in the table below:

Table 1: Results of clinical evaluation method for determining the viscosity of saliva:

<table>
<thead>
<tr>
<th>State</th>
<th>Control group (40)</th>
<th>Test group (40)</th>
<th>Total (80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34 (85%)</td>
<td>7 (17,5%)</td>
<td>51 (51,25%)</td>
</tr>
<tr>
<td>2</td>
<td>6 (15%)</td>
<td>26 (65%)</td>
<td>32 (40%)</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>7 (17,5%)</td>
<td>7 (8,75%)</td>
</tr>
</tbody>
</table>

Results of laboratory method:

Table 2. Results of laboratory method for the test group

<table>
<thead>
<tr>
<th>V</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.45</td>
<td>2.15</td>
<td>1.35</td>
<td>1.93</td>
<td>1.91</td>
<td>1.9</td>
<td>1.15</td>
<td>1.9</td>
<td>1.87</td>
<td>1.47</td>
<td>2.09</td>
<td>1.19</td>
<td>1.85</td>
<td>1.73</td>
</tr>
<tr>
<td>V</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>100</td>
<td>1.45</td>
<td>1.93</td>
<td>1.13</td>
<td>2.00</td>
<td>2.29</td>
<td>1.99</td>
<td>1.27</td>
<td>1.35</td>
<td>1.23</td>
<td>1.32</td>
<td>1.41</td>
<td>1.4</td>
<td>2.18</td>
<td>1.88</td>
</tr>
<tr>
<td>V</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1.92</td>
<td>2.13</td>
<td>1.96</td>
<td>1.39</td>
<td>2.11</td>
<td>1.42</td>
<td>1.37</td>
<td>1.36</td>
<td>2.31</td>
<td>1.38</td>
<td>1.49</td>
<td>1.25</td>
<td>1.69</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Results of laboratory method for the control group

<table>
<thead>
<tr>
<th>V</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.51</td>
<td>1.12</td>
<td>1.16</td>
<td>1.35</td>
<td>1.12</td>
<td>1.13</td>
<td>1.32</td>
<td>1.1</td>
<td>1.09</td>
<td>1.51</td>
<td>1.28</td>
<td>1.31</td>
<td>1.27</td>
<td>1.1</td>
</tr>
<tr>
<td>V</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>100</td>
<td>1.18</td>
<td>1.47</td>
<td>1.31</td>
<td>1.62</td>
<td>1.23</td>
<td>1.19</td>
<td>1.18</td>
<td>1.17</td>
<td>1.29</td>
<td>1.31</td>
<td>1.16</td>
<td>1.15</td>
<td>1.15</td>
<td>1.22</td>
</tr>
<tr>
<td>V</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1.3</td>
<td>1.13</td>
<td>1.11</td>
<td>1.63</td>
<td>1.15</td>
<td>1.25</td>
<td>1.2</td>
<td>1.25</td>
<td>1.25</td>
<td>1.14</td>
<td>1.14</td>
<td>1.14</td>
<td>1.21</td>
<td></td>
</tr>
</tbody>
</table>

Note:
V = velocity zone;
M = average of the samples at a certain speed.
1,2,3 ... etc = number of samples.
Laboratory test results for determining the viscosity of saliva are presented in the table below:

### Table 4: Evaluation results of laboratory method for determining the viscosity of saliva:

<table>
<thead>
<tr>
<th>Viscosity</th>
<th>Literature values</th>
<th>Control group (40)</th>
<th>Test group (40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1.1-1.32</td>
<td>34 (85%)</td>
<td>7 (17.5%)</td>
</tr>
<tr>
<td>Medium</td>
<td>1.33-2.0</td>
<td>6 (15%)</td>
<td>26 (60%)</td>
</tr>
<tr>
<td>High</td>
<td>&gt;2.0</td>
<td>0</td>
<td>7 (17.5%)</td>
</tr>
</tbody>
</table>

In the control group we found 34 patients with values of viscosity between 1.1-1.32 considered normal, compared with only 7 patients from test group with same values.

The medium values between 1.33-2.0 were found at 6 patients from the control group and 26 patients from the test group.

The high viscosity value up to 2.0 was found only in the test group, at 7 patients.

- The higher value of a patient salivary viscosity in the control group is 1.62, this patient suffering from gastric ulcer;
- Highest value of salivary viscosity is 2.29, found at a patient suffering from diabetes and wears acrylic dentures for four years;
- The higher viscosity of saliva at a complete edentulous patient that presents no overall condition is 1.92 and wears acrylic dentures for 10 years;
- Salivary viscosity value of 1.32 (upper limit considered normal value) in the test group corresponds to a patient without general conditions, without any medication, but wearing acrylics dentures for 3 months;
- The lowest, considered pathological, is 1.35 and corresponds to a patient not suffering from any disease and wear acrylic dentures for four months.

### DISCUSSIONS

Compared to the average values from literature [3,5], from the control group observed a change in salivary viscosity in 6 patients, 5 of them suffer from various general diseases. In the study group, shows the modified salivary viscosity 25 of 33 patients suffering from various general conditions.

Modification of salivary viscosity on the remaining 8 patients could be attributed to wearing acrylic dentures because they do not suffer from any illness, is generally not found in any drug treatment and wear dentures over five years, while the remaining 7 healthy patients does not have these changes acrylic denture because of shortly wearing (1-3 months).

### CONCLUSIONS

The laboratory test method results correlate with clinical test results for determining the viscosity of saliva.

In these tests it is found that the viscosity is changed in both groups (control and test). These changes in
salivary viscosity may be attributed to general diseases and medications.
For the entire test group we observed an increase in salivary viscosity including those who apparently do not present any general disease, these changes can be caused by wearing complete acrylic dentures, which change the temperature and pressure inside the space between the denture and the surface support.
Our results are correlated with those obtained in the literature, confirming the fact that the wearing of acrylic complete dentures lead to changes in salivary fluid quality.

REFERENCES