Research Article

Evaluation of Periodontal Tissues Condition in Undergraduate Medical Students with Different Anxiety Levels

Tetiana Pavliuk*, Mukola Rozhko, Oksana Panchak

Abstract

The aim of the study was to investigate the relationship between the level of anxiety with periodontal tissue lesions in undergraduate students at a medical university. Observations were performed by medical students of the second year of study. There was used H. Ayzenko's questionnaire to determine the level of personal anxiety. The evaluation of the condition of periodontal tissues was performed using the appropriate indexes: the papillary-marginal-alveolar index, the periodontal index, the Schiller-Pisarev's test (Svrakov's iodine number), and sulcus bleeding index. The results of the study showed a direct dependence of the manifestation of periodontal tissue diseases on the level of psycho-emotional stress. Analyzing the PMA index it was noted that the higher level of anxiety, the higher number of this index and, accordingly, the more distinct signs of inflammation are clear: with low level - 4.63±2.58%, with an average level - 28.42±1.29% and at a high level - 41.6±2.46%. The quantitative significance of the periodontal index also depends on the degree of anxiety in the students: the lowest rate was in the students of group I with a low level of anxiety (0.15±0.08); the indices of groups II and III are 0.97±0.04 and 1.35±0.07 respectively. The Schiller-Pisarev's test showed that the higher anxiety level of students has the higher number of this index. Analyzing the data of index of gum's bleeding, there was observed an increase in it, depending on the degree of anxiety (p<0.001).

Keywords

psycho-emotional stress; anxiety; medical students

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Problem statement and analysis of the recent research

The epidemiological studies of recent years have shown the high prevalence of periodontal tissue diseases among the social and age groups and determine the factors that have influence on their development [1].

According to WHO’s data (1990), which is based on 53 countries’ population study, periodontal tissue diseases are diagnosed in 98% of patients. The majority of these people are young and middle-aged. In Ukraine, the frequency of these diseases in people under the age of 40 is 50-60% [2].

There are many factors that may cause periodontal diseases. The pathological process may be caused by various factors of both exogenous and endogenous genesis. According to modern concepts, the significant role in periodontal diseases’ pathogenesis is played by changes in the central and peripheral nervous systems [3].

Professional overload of emotional character in absence of rational rest of most people leads to chronic emotional stress state. The high level of psycho-emotional stress associated with information overload, acceleration of pace of life, unfavorable study and work conditions, can contribute to the increase of the incidence of inflammatory-dystrophic diseases of periodontal tissues. The recent years’ clinical studies have confirmed the high sensitivity of periodontal tissues to stress. The analysis results of various factors’ influence on the occurrence of periodontal tissues diseases indicate that stress is a determining factor in the development of periodontal disease [3].

It has been shown that the long-term effect of immobilization stress on the person is accompanied by redistribution of circulating blood, changes in microcirculation and destructive damage of microvessels [4], increased free radical processes [5], decrease of oxygen consumption [6], violation of energy metabolism [7] and development of bone tissue dystrophy [8, 9, 10]. At the same time, the issues of stress-induced transport disorders and oxygen utilization in soft and hard tissues of periodontium remains almost unclear [11].

It should be noted that factors that cause inflammatory diseases of the periodontium are divided into primary and secondary ones. The primary complex of causes includes dental plaque and inflammation reactions of the periodontium caused by it. The secondary complex of reasons encompasses local and system factors that allow the components of the primary complex to be realized [10, 11].
At present inflammatory diseases of the periodontal disease are considered as an opportunistic infections, which depend not only on the presence of pathogenic bacteria, but also on the environment that contributes to their reproduction (local change of pH, anaerobic microflora, changes in the body’s resistance), as well as functional and parafunctional factors, which include oral breathing, atypical articulation of the tongue, bruxism. Stress conditions contribute to dysfunction of salivary glands, quantitative and qualitative changes in the oral fluid and saliva, which leads to the emergence and development of inflammatory processes in the periodontal tissues [12].

Reduction of the saliva amount - hyposalivation, xerostomia, reduces the mechanical removal of food residues. And this creates a favorable nutrient for microorganisms’ development. In addition, the increase of the saliva viscosity, reduction of the rate and speed of its secretion reduce the formation and secretion of secretory immunoglobulin A, which prevents the bacteria attachment to the surface of the tooth [13].

The concept of work is that persons with certain dental diseases, namely generalized periodontitis, have general psycho-physiological peculiarities that play a significant role in disease course. The study of the interconnections of periodontal tissue diseases with body’s individual-typological properties may contribute not only to further scientific substantiation of the typical characteristics of the individual varieties of morphofunctional and psycho-physiological indicators of the organism, but also to the establishment of a level of its stability to the damage to the periodontal tissues.

**Objective of the research.** To study the relationship between anxiety level and periodontal tissues’ injury among junior students of medical university.

### 1. Materials and methods

We have performed an examination of 50 2nd year students of medical university. The research groups were formed taking into account the psycho-emotional load. Group I included 18 students with a low anxiety level, group II - 18 students with average anxiety level, and in group III - there were 14 students with a high level of anxiety.

There was used H. Ayzenko’s questionnaire to determine the level of personal anxiety. Anxiety was counted by the total estimation method. The obtained results were interpreted using Table 1.

**Table 1.** Interpretation of the level of anxiety, depending on the number of points

<table>
<thead>
<tr>
<th>Anxiety</th>
<th>low</th>
<th>average</th>
<th>high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>0-7</td>
<td>8-14</td>
<td>15-20</td>
</tr>
</tbody>
</table>

The evaluation of the condition of periodontal tissues was performed using the appropriate indexes: the papillary-marginal-alveolar index (PMA, C.Parma, 1960), the periodontal index (PI Russel, 1956), the Schiller-Pisarev’s test (Svrakov’s iodine number, 1963), the sulcus bleeding index (SBI, Muhlemann and Son, 1971).

The interpretation of examination results was performed on the basis of personal data and clinical examination of dental patient. There was used M.F.Danilevskiy’s classification to diagnose the periodontal diseases.

The results of the research were statistically analyzed with the help of statistical package “Stat Soft 6.0”, classical methods of variation statistics. The difference between studied parameters was evaluated using Student’s criterion.

### 2. Results of the research and their discussion

According to the results of psychological study of second year medical students, a direct dependence of general anxiety level on manifestation prevalence of pathological process in periodontal tissues was revealed. This testing allowed us to divide the students into three groups depending on anxiety level (Table 2) and compare the periodontal status data of junior students, depending on which group they belong to.

**Table 2.** Students’ distribution into groups according to the anxiety level

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of examinee</th>
<th>Level of anxiety</th>
<th>Results, points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18</td>
<td>low</td>
<td>5.94±0.27</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>average</td>
<td>11.38±0.44*</td>
</tr>
<tr>
<td>III</td>
<td>14</td>
<td>high</td>
<td>15.92±0.25**</td>
</tr>
</tbody>
</table>

**Notes:**

* - the probability of differences between the indeces of the groups I and II according to Student’s criterion, p<0.001;  
** - the probability of differences between the indeces of the groups II and III according to Student’s criterion, p<0.001.

In anxiety level study, we have observed that out of 50 examined students, low level of anxiety was found in 18 examined, which is 5.94±0.27. The average level of anxiety was determined in 18 examined patients, which are 11.38±0.44 points. A high level of anxiety was determined in 14 students with an average anxiety value of 15.92±0.25. Having analyzed it, we can see that the index of group I significantly differs from the index of group II (p<0.001). It should be noted that the value of group III index is statistically higher than that of the examined persons from the group II (p<0.001). According to the study of anxiety index, we observed that the higher level of anxiety the higher the rate, which is statistically confirmed.

Having performed the periodontal examination in the three groups according to the level of anxiety, we received the following results. The PMA index (Table 3) of group I students with a low level of anxiety is 4.63±2.58%, which corresponds to the mild inflammatory process of periodontal tissues. If
We have observed that the indices of all three groups are statistically different, but they all indicate the initial stage of periodontal disease.

Table 3. The indicators of PMA index depending on the anxiety level

<table>
<thead>
<tr>
<th>Group number</th>
<th>Number of examinee</th>
<th>Level of anxiety</th>
<th>PMA, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18</td>
<td>low</td>
<td>4.63±2.58</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>average</td>
<td>28.42±1.29*</td>
</tr>
<tr>
<td>III</td>
<td>14</td>
<td>high</td>
<td>41.6±2.46**</td>
</tr>
</tbody>
</table>

Notes:
* - the probability of differences between the indices of the groups I and II according to Student’s criterion, p<0.001;
** - the probability of differences between the indices of the groups II and III according to Student’s criterion, p<0.001.

Having performed the analysis of the periodontal index (PI), we can see that the quantitative significance of this index also depends on the degree of students’ anxiety (Table 4). The lowest rate was observed in students of group I with a low level of anxiety, which is 0.15±0.08. If compared with the data of groups II and III, where the indicators are 0.97±0.04 and 1.35±0.07 respectively, then it should be noted that indices in these groups are higher, which is statistically confirmed (p<0.001). After interpreting the periodontal index results, it should be noted that the points of all groups indicate presence of initial - the I\(^{st}\) stage of severity of the inflammatory process. We have observed that the indices of all three groups are statistically different, but they all indicate the initial stage of periodontal disease.

Table 4. The indicators of PI index depending on the anxiety level

<table>
<thead>
<tr>
<th>Group number</th>
<th>Number of examinee</th>
<th>Level of anxiety</th>
<th>PI, points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18</td>
<td>low</td>
<td>0.15±0.08</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>average</td>
<td>0.97±0.04*</td>
</tr>
<tr>
<td>III</td>
<td>14</td>
<td>high</td>
<td>1.35±0.07**</td>
</tr>
</tbody>
</table>

Notes:
* - the probability of differences between the indices of the groups I and II according to Student’s criterion, p<0.001;
** - the probability of differences between the indices of the groups II and III according to Student’s criterion, p<0.001.

As it was shown by Schiller-Pisarev’s test (Svrakov’s iodine number), the tendency to this indicator increase is also observed (Table 5). The higher is the students’ anxiety, the higher is the indicator of this index. As we can see, the index of this test for students with a low level of anxiety is quite low and is 0.14±0.07 points, which corresponds to poorly expressed inflammation. If we compare the data of students with average and high level of anxiety, then the results are statistically higher (p<0.001) and equal to 3.21±0.17 and 4.65±0.34 points that corresponds to a reasonably pronounced inflammatory process. Taking into account the data of Schiller-Pisarev’s test, it should be noted that the higher is anxiety, the more pronounced is the inflammatory process of periodontal tissues.

Table 5. The indicators of Schiller-Pisarev’s test (Svrakov’s iodine number) depending on the anxiety level

<table>
<thead>
<tr>
<th>Group number</th>
<th>Number of examinee</th>
<th>Level of anxiety</th>
<th>Schiller-Pisarev’s test, points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18</td>
<td>low</td>
<td>0.14±0.07</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>average</td>
<td>3.21±0.17*</td>
</tr>
<tr>
<td>III</td>
<td>14</td>
<td>high</td>
<td>4.65±0.34**</td>
</tr>
</tbody>
</table>

Notes:
* - the probability of differences between the indices of the groups I and II according to Student’s criterion, p<0.001;
** - the probability of differences between the indices of the groups II and III according to Student’s criterion, p<0.001.

Analyzing the data of the sulcus bleeding index (SBI) (Table 6), there was observed an increase of it that depends on anxiety level (p<0.001). Thus, if students’ anxiety level is 0.13±0.07 points and corresponds to healthy gums appearance, but with slight bleeding during probing, then this level is significantly higher with a high level of anxiety (p<0.001) and is 1.01±0.08 points, which indicates the average degree of periodontal tissues inflammation. Thus, we can see that the higher is the anxiety level, the higher is the rate of gums bleeding.

Table 6. The indicators of the sulcus bleeding index (SBI) depending on the anxiety level

<table>
<thead>
<tr>
<th>Group number</th>
<th>Number of examinee</th>
<th>Level of anxiety</th>
<th>SBI, points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>18</td>
<td>low</td>
<td>0.13±0.07</td>
</tr>
<tr>
<td>II</td>
<td>18</td>
<td>average</td>
<td>0.77±0.06*</td>
</tr>
<tr>
<td>III</td>
<td>14</td>
<td>high</td>
<td>1.01±0.08**</td>
</tr>
</tbody>
</table>

Notes:
* - the probability of differences between the indices of the groups I and II according to Student’s criterion, p<0.001;
** - the probability of differences between the indices of the groups II and III according to Student’s criterion, p<0.001.
3. Prospects for further research
We plan to study the relationship between psycho-emotional stress and periodontal tissue diseases in senior students in future.

4. Conclusions
1. Having performed an analysis the PMA index, we can note that the higher is the level of anxiety, the higher is the number of this index and, accordingly, the more distinct signs of gums inflammation are clear: with low level of anxiety - 4.63±2.58%, with an average level of anxiety - 28.42±1.29% and with a high level of anxiety - 41.6±2.46%.

2. The quantitative significance of the periodontal index also depends on the degree of anxiety in the students: the lowest index was in the students of group I with a low level of anxiety (0.15±0.08); the indices of the groups II and III are 0.97±0.04 and 1.35±0.07, respectively.

3. The Schiller-Pisarev’s test indicators showed that the higher is the anxiety level in students, the higher is the number of this index.

4. Analyzing the data of SBI index, we have observed an increase in it, depending on the degree of anxiety (p<0.001).

References


