Background

One of the key enzymes of the antioxidant system is superoxide dismutase (SOD) that catalyzes the dismutation of superoxide anionic radical (O$_{2}^{−}$) to molecular oxygen (O$_{2}$) and hydrogen (H$_{2}$O$_{2}$). It was revealed that activity of SOD is decreased in patients with decompensated type 2 diabetes (T2D) but there is insufficient data about enzyme activity in compensated states and prediabetes.

Purpose

The purpose of investigation was to analyze the state of SOD activity in patients with compensated T2D and prediabetes.

Materials and methods

195 included patients were divided into 5 groups:

- **Group 1** – 23 patients with impaired fasting glucose (IFG),
- **Group 2** – 42 patients with impaired glucose tolerance (IGT),
- **Group 3** – 41 patients with T2D,
- **Group 4** – 48 patients with T2D and concomitant coronary heart disease (CHD) and
- **Group 5** – 41 almost healthy person (control).

Characteristics of groups presented in Table 1. Activity of SOD was measured by reduction of nitrotriazolium by superoxide radical (CU/ml).

Table 1 – Characteristics of groups

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>44,95±7,84*</td>
<td>48,88±7,56</td>
<td>49,61±6,86</td>
<td>54,58±5,53*</td>
<td>49,76±7,78</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>5,42±0,39*</td>
<td>5,67±0,51**</td>
<td>6,59±1,15**</td>
<td>6,52±0,59**</td>
<td>5,32±0,40</td>
</tr>
<tr>
<td>Fasting glucose (mmol/l)</td>
<td>5,36±0,59*</td>
<td>5,84±1,19**</td>
<td>5,80±1,48**</td>
<td>6,35±0,78**</td>
<td>4,95±0,46</td>
</tr>
</tbody>
</table>

Statistical significance * p < 0.01; ** p < 0.001 compared to control group. Results presented as Mean±SD.

Results

![SOD](image)

Picture 1 – Results of SOD measurements in study groups

Results of SOD measurements in study groups (Median, CU/ml) presented in Picture 1. The lowest activity was registered in group 4 (71,71 [48,14;80,37] CU/ml) and in group 3 (76,49 [35,43;85,22] CU/ml) compared to control group (104,96 [66,86;142,82] CU/ml) (P$_{4-5}$$<0,001$) (P$_{3-5}$$<0,005$).

Activity of SOD was significantly higher in patients with IGT (92,95 [60,21;144,02] CU/ml) compared to other groups (P$_{2-3}$$<0,005$, P$_{2-4}$$<0,001$) and almost was not different compared to almost healthy person (p>0,1).

Conclusions

1. T2D is associated with decreased activity of SOD which is more significant when associated with CHD.
2. Prediabetes is not associated with changes in the activity of SOD.

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