

The State of Superoxidedismutase Activity as Marker of Oxidative Stress in Patients with Impaired Glycemic States

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Background

One of the key enzymes of antioxidant system is superoxide dismutase (SOD) that catalyzes dismutation of superoxide anionic radical ($O_2^{\cdot-}$) to molecular oxygen (O_2) and hydrogen (H_2O_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.

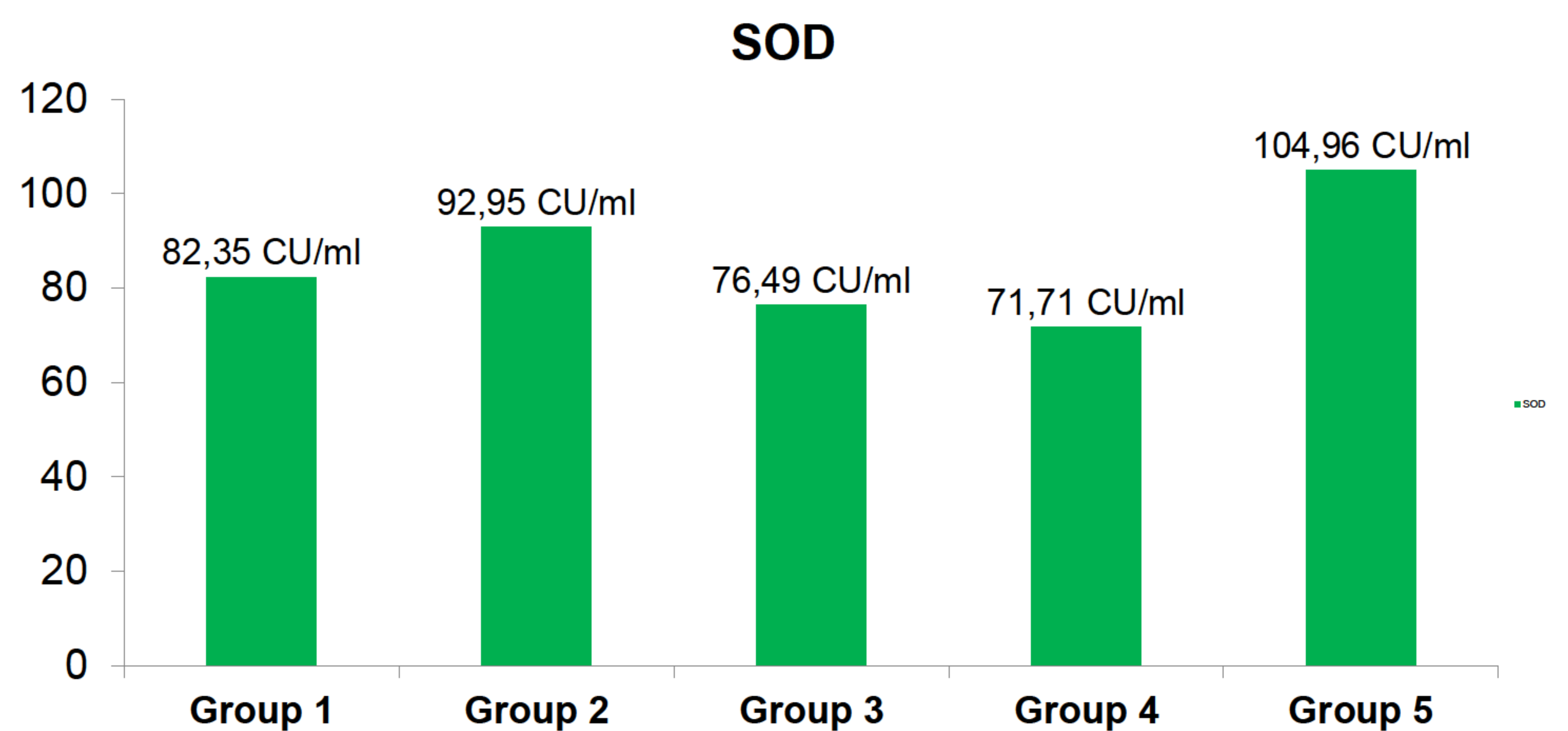
Activity of SOD was measured by reduction of nitrotetrazolium by superoxide radical (CU/ml).

Table 1 – Characteristics of groups

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

Statistical significance * p < 0,01; ** p < 0,001 compared to control group
Results presented as Mean±SD.

Results



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 ($p>0,1$).

We didn't reveal any significance in activity of SOD on patients with IFG and other groups.

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.

