TUMOR NECROSION FACTOR-α AND INSULIN RESISTANCE IN PATIENTS WITH NONALCOHOLIC FATTY LIVER DISEASE IN COMBINATION WITH TYPE 2 DIABETES MELLITUS

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Tumor necrosis factor-α (TNF-α) is an adipocytokine that can cause the cytotoxic effects and stimulate the apoptosis, impairing liver function. There is a need in further study of TNF-α influence on liver cells properties and its role in the pathogenesis of nonalcoholic fatty liver disease (NAFLD) against a background of type 2 diabetes mellitus (T2DM) in patients with different trophological status.

**Purpose.** The study was designed to assess the relationship between the level of TNF-α and indices of carbohydrate metabolism in patients with NAFLD and its combination with T2DM with different trophological status.

**Subjects.** The study was performed on 90 patients with isolated NAFLD and in combination with T2DM with normal weight and obesity (body mass index ≥30 kg/m²). All patients were divided into 3 groups: group 1 (n=20) comprised the patients with isolated NAFLD, group 2 (n=20) patients with combination of NAFLD and T2DM with normal body weight and group 3 (n=50) patients with comorbid disorder and obesity. The controls (n=20) were apparently healthy individuals.

Methods. The study was carried out using the following methods: the level of serum fasting blood glucose (FBG) was determined by glucose oxidase method ("Diabetes-Test" kit), immunoreactive insulin (IRI) - by immunosorbent sandwich method ("DRI" kit), HOMA-IR was calculated using the formula: HOMA = IRI × FBG/22.5. The level of TNF-α was determined by immunoassay method ("Vector-Best" kit).

**Results.** The mean level of TNF-α was significantly (p<0.001) increased in all groups in comparison with the controls, where it was (24.2 ± 1.06 ng/mL), the level was the highest in group 3 (96.6 ± 0.72 ng/mL) and was significantly different from that in groups 1 and 2 (66.2 ± 1.07 ng/mL and 86.4 ± 1.21 ng/mL, respectively), fig. 2. In groups 1 and 2 the correlation was established between TNF-α and IRI (r=0.33, p<0.05 and r=0.37, p<0.05, respectively). In group 3 (with comorbid disorder and obesity) the significant correlation was established between the level of TNF-α and FBG (r=0.46, p<0.05), IRI (r=0.78, p<0.05) and HOMA-IR (r=0.64; p<0.05), fig. 3.

**Conclusions.** The study demonstrates correlation between TNF-α and indices of carbohydrate metabolism is connected with the ability of TNF-α to enhance the carbohydrate metabolism, insulin resistance, and support the role of TNF-α in pathogenesis of NAFLD, namely, in damage of hepatic gluconeogenesis, especially in patients with associated T2DM and obesity. In addition, isolated NAFLD can independently cause the metabolic consequences. Determination of TNF-α level can provide an opportunity to assess the risk of progression of carbohydrate metabolism disorders on an early stage.

**Fig. 2.** THE LEVEL OF TNF-α IN PATIENTS WITH NAFLD AND IN COMBINATION WITH T2DM

**Fig. 3.** THE INDEXES OF CARBOHYDRATE METABOLISM IN PATIENTS WITH NAFLD AND IN ITS COMBINATION WITH T2DM WITH DIFFERENT TROPHOLOGICAL STATUS

**Fig. 1.** GROUPS OF PATIENTS

- Diffuse enlargement of hepatic parenchyma "brightness";
- Blurring of vascular pattern;
- Distal echo attenuation;
- Moderate hepatomegaly.