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ŽMOGAUS RAIDOS PERSPEKTYVOS IR SVEIKATA
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THE INFLUENCE OF TYPE 1 DIABETES AND CHRONIC PSYCHOLOGICAL STRESS ON HEPATIC FAT CONTENT AND HEPATOCYTE NECROSIS

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Background and Aim: Chronic psychological stress is a known cause of hepatic lipid accumulation, which manifests as steatosis and ballooning of hepatocytes, whereas the influence of type 1 diabetes on steatosis formation remains debated. Both chronic psychological stress and type 1 diabetes are shown to favour hepatocyte necrosis. This study aims to show the effects of chronic psychological stress in conjunction with type 1 diabetes on steatosis and hepatocyte necrosis, in contrast to both conditions being present independently.

Materials and Methods: Histological analysis of liver specimens was performed after an experiment involving groups of rats: Control group (n=9) (no type 1 diabetes, no stress); Stress group (n=9) was subjected to chronic psychological stress, induced using a restraint stress protocol; T1DM group (n=8) obtained streptozotocin-induced type 1 diabetes; T1DM+Stress group (n=9) was subjected to both type 1 diabetes and stress. After euthanasia, H&E slides were prepared and histological analysis was performed using the QuPath (0.4.4) programme. In each slide, 10 squares of 250x250µm were randomly selected, the nuclei of normal, steatotic, ballooned, and necrotic hepatocytes were manually marked and automatically counted. The percentage of fatty and necrotic hepatocytes was identified, and a t-test was performed.

Results: A statistically significant increase in steatosis and ballooning was observed in the Stress group (14.06%) compared with the Control (4.25%) and T1DM (3.21%) groups ($p < 0.05$). In hepatocyte necrosis, a statistically significant increase was found in all experimental groups (Stress: 17.61%; T1DM: 21.46%; T1DM+Stress: 18.94%) compared to the Control group (7.82%) ($p < 0.05$).

Conclusions: Type 1 diabetes appears to have an inhibitory effect on steatosis formation, both in stress-induced steatosis and in non-stressed animals, likely through the absence of insulin. Both conditions appear to cause necrosis of hepatocytes, potentially through indirect metabolic and inflammatory pathways.

Keywords: chronic psychological stress, liver, necrosis, steatosis, type 1 diabetes