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Study of the Corrective Mechanisms of Total Polyphenols Isolated from *Plantago major* L. on Hepatocellular Structural Changes under Experimental Diabetes Mellitus Conditions

Tukhtaeva Feruza Shonazarovna
University of Business and Science Tashkent branch, Department of Natural Sciences Associate Professor, PhD.
feruzatuhtaeva601@ubsu.uz

Abstract

Research purpose *P. major l.* from the plant separate received polyphenols of the sum in rats alloxane using called experiential sugary diabetes in dynamics liver of hepatocytes morphological to the structure effect from assessment consists of Experimental alloxan sugary diabetes male rats belly to the void alloxan one 0.4 ml of citrate at a dose of 150 mg/kg once in the clipboard input the way with we called Group I animals control the group organize did , group II to animals every day mouth through polyphenols in the amount of 50 mg/kg , group III to animals and - at a dose of 100 mg/kg entered . 8 rats intact the group organize did Ether narcosis effect under animals decapitation the way with alloxane diabetes it was slaughtered on the 21st day of its development . *P. major l.* polyphenols amount when used , liver in the tissue hemocirculator disorders and some of hepatocytes destructive changes with in small quantities liver parenchyma damage furnaces observed . Dystrophy mixed character (protein , fat dystrophy), necrotic changes more of fragments central in parts to be in the portal tracts of infiltration lack of experiential alloxane in diabetes *P. major l.* polyphenols of the amount healer feature from existence proof gives

Keywords: alloxane diabetes , *P. major l.* polyphenols sum , liver , hepatocyte .

METHODS: Morphological research methods: experimental alloxan diabetes mellitus and P. major l. The study of the morphological condition of the liver during the treatment with the sum of polyphenols isolated from the plant was carried out in 21 days of the experiment. Animals of intact, control and experimental groups were decapitated under light ether anesthesia. The livers of the animals were cut, dried using filter paper, and cut into pieces using a razor blade. Liver slices were fixed in 10% neutral formalin solution. Then the slices were washed 3-4 times in 800 % ethyl alcohol and dehydrated in increasing concentrations of alcohols (96 % and 100 % alcohol). Then into pieces paraffin poured Each paraffin from the block 60-80 μm from each other in the distance 5–8 μm thick 6-8 cuts received Received the material diagnosis to do for histological methods applied . Deparaffinized cuts tissue and cell structures learning for hematoxylin and eosin with painted and a VM 200 microscope studied under (ind. cat . 4.0; 10.0/0.25; 100/0.25, eyepiece WF 10x20) .

RESULTS: Intact rats in the liver hepatocytes columns in the form of organized . Hepatocytes almost one different to dimensions have and their in the center round nuclei observed . Portal tracts vein, artery and grass ways own into take them around very little expressed lymphoid - cellular infiltration was observed (Fig. 1).

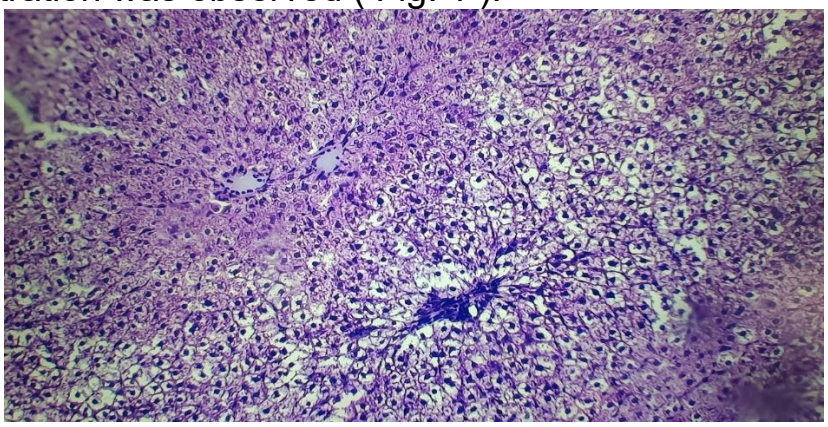


Figure 1. Intact rat liver tissue.
Hematoxylin-eosin. Magnification x 100.

On the 21st day of experimental alloxan diabetes mellitus, destructive and hemomicrocirculatory changes were observed in the liver. These changes were in the form of hemorrhagic infiltration in the form of hemorrhagic infiltration of the central vein and liver sinusoids.

Cellular infiltrates consisting of lymphocytes, histiocytes and a small number of plasma cells were detected around the vessels and sinusoids. Against the background of the specified microcirculatory disorders, fatty dystrophic and focal destructive changes were noted in hepatocytes, mostly in the central parts of the liver lobes, together with foci of collicative necrosis (Figs. 2 and 3).

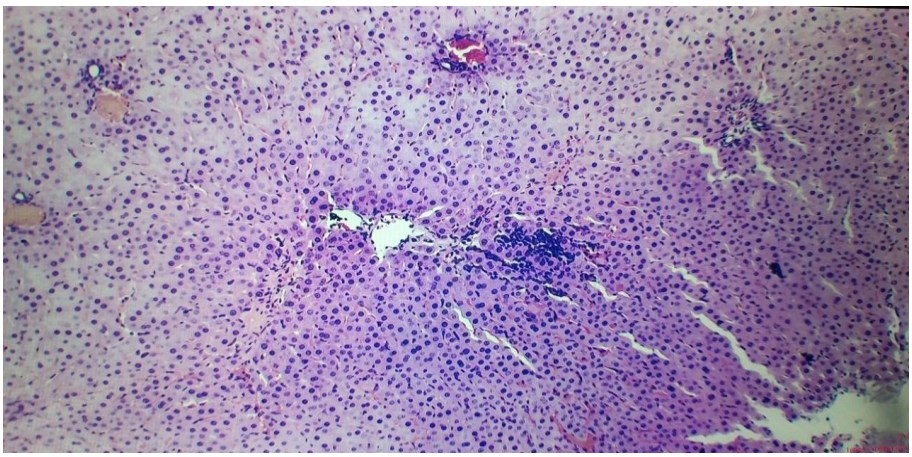


Figure 2. Alloxan diabetic rat liver tissue (day 21).
Destructive changes in hepatocytes, expansion of sinusoidal hemocapillaries, focal inflammatory infiltration of the portal tract with mononuclear cells, necrosis of the central lobular part of hepatocytes. Hematoxylin-eosin. Magnification x 200. Lens - 20 ^{x}; Eyepiece - 10 ^{x}.

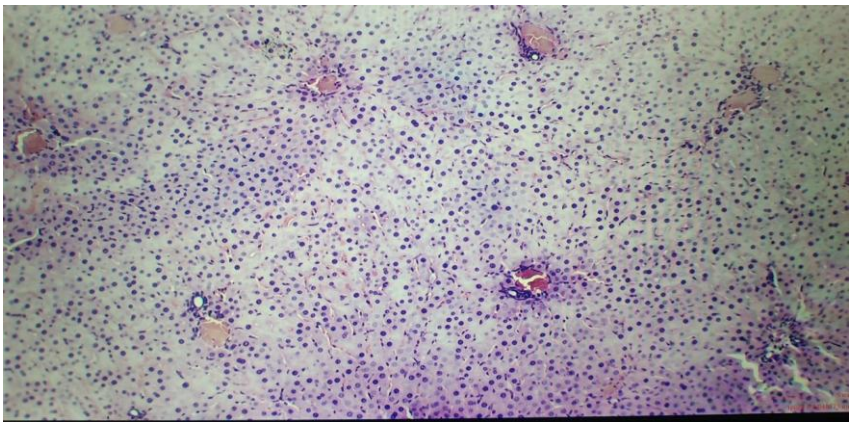
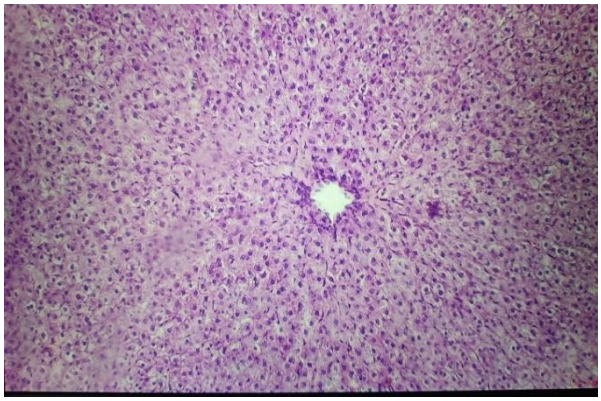


Figure 3. Alloxan diabetic rat liver tissue (day 21).
Diffuse hydropic dystrophy with foci of small drops of fat in hepatocytes, foci of necrosis with lympho-macrophagal infiltration. Hematoxylin-eosin. Magnification x 100. Objective - 10 ^{x}; Eyepiece - 10 ^{x}.

P. major l., which is part of the family of Zubturums, for the treatment of rats with alloxan diabetes mellitus . When the amount of polyphenols was administered in different doses for 21 days, stereotypic morphological changes were observed in the liver. *P. major l.* Inflammatory infiltration with mononuclear cells in the liver of rats receiving polyphenols extract at a dose of 50 mg/kg for 21 days was detected to a low degree, and it was manifested in the form of infiltration of chain cells only around some portal tracts. In this case, destructive changes of hepatocytes in the form of mixed small droplets, vacuole



hydropic and fatty dystrophy with foci were observed, which were more common in the central part of liver lobes (Fig. 4).

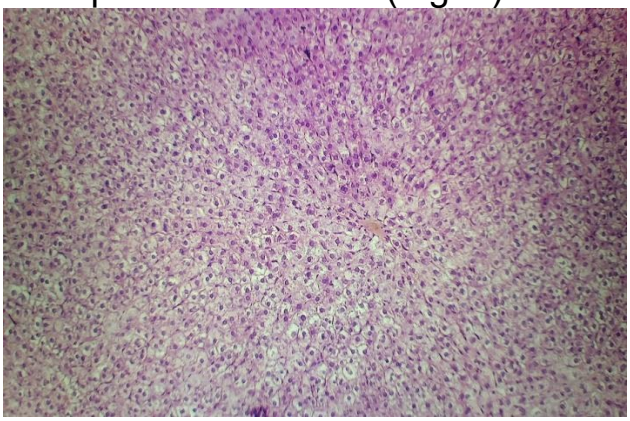


Figure 4. *P. major l.* the sum of polyphenols in liver tissue of alloxan diabetic rats injected at a dose of 50 mg/kg.
Small amount of inflammatory infiltration, foci of hepatocytes with small droplet, vacuolar and fatty dystrophy. Hematoxylin-eosin. Magnification x200.

In contrast, in the treatment of experimental diabetes, *P. major l.* when the sum of polyphenols was used in a dose of 100 mg/kg, on the 21st day of the disease, the compartmental structure and architecture of the liver was shown to be quite preserved. Mainly hydropic dystrophy, mild lymphohistiocytic reaction, small necrosis of hepatocytes inside the compartments and not very strong fullness of sinusoidal capillary spaces were observed. The veins of the portal tracts were also in this condition (Fig. 5).

Yu Kori are *P. major l.* showed that when the sum of polyphenols was administered to alloxan-diabetic rats at a dose of 100 mg/kg, liver parenchyma was more clearly preserved than when they were administered at a dose of 50 mg/kg.

Lobular architecture is preserved, hepatocytes are monomorphic, and a small number of sinusoidal capillaries are full. Portal tract veins venous and analogous in arterial types condition observed , liver cells in the cytoplasm average level dystrophic changes signs is determined .

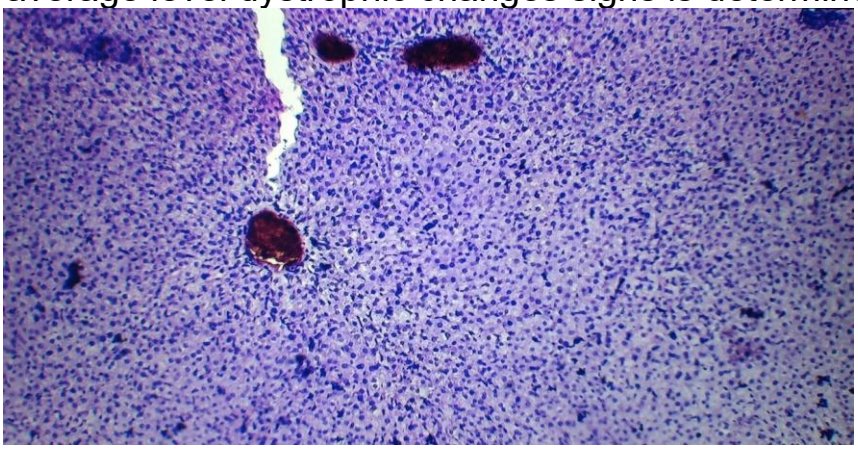


Figure 5. P. major l. alloxan diabetic rat liver tissue injected with the sum of polyphenols at a dose of 100 mg/kg. Hematoxylin-eosin. Magnification x200.

DISCUSSION: Thus, the mixed character of dystrophy (protein, fatty dystrophy), presence of necrotic changes more in the central parts of slices, less infiltration in portal tracts in experimental alloxan diabetes *P. major l.* indicates the therapeutic properties of the sum of polyphenols and shows that the liver parenchyma was more clearly preserved when administered at a dose of 100 mg/kg than when administered at a dose of 50 mg/kg.

Used literature list

1. Ismailov S.I. Quality of life assessment in children and adolescents with type1 diabetes mellitus on insulin pump therapy in Uzbekistan // European science review. – 2019. – T. 2. – №. 1-2. – P.202-206.
2. Adeghate E., Schattner P., Dunn E. An update on the etiology and epidemiology of diabetes mellitus //Annals of the New York academy of sciences. – 2006. – T.1084, №1. – P.1-29.
3. Barron E., Bakhai C., Kar P., Weaver A., Bradley D., Ismail H., Knighton P., Holman N., Khunti K., Sattar N. Associations of type 1 and type 2 diabetes with COVID-19-related mortality in England: A whole-population study // Lancet Diabetes Endocrinol. – 2020. – T.8. - P.813–822.
4. Carey I., Critchley J.A., Dewilde S., Harris T., Hosking F.J., Cook D.G. Risk of Infection in Type 1 and Type 2 Diabetes Compared With the General Population: Matched Cohort Study // Diabetes Care 2018. – V.41, №.3 - P.513–521.
5. Van C.R., Critchley J.A. The interaction of diabetes and tuberculosis: translating research to policy and practice // Tropical Medicine and Infectious Disease. – 2021. – T.6. – №.1. – P.1-8.
6. Lam D.W., LeRoith D. The worldwide diabetes epidemic // Current Opinion in Endocrinology, Diabetes and Obesity. – 2012. – T.19. – №.2. – P.93-96.

7. Katsarou A. Type 1 diabetes mellitus //Nature reviews Disease primers. – 2017. – T.3, № 1. – P.1-17.
8. Miller K.M. Current state of type 1 diabetes treatment in the US: updated data from the T1D Exchange clinic registry // Diabetes care. – 2015. – T.38, № 6. – P.971-978.
9. Степанова С.И., Галичий В.А. Космическая биоритмология. Хронобиология и хрономедицина. – М. Изд-во Триада-Х, 2000. – С.1– 239.
10. Lenzen S. The mechanisms of alloxan and streptozotocin induced diabete // Diabetologia. – 2008. – V.51, № 2. – P.216–226.
11. Tukhtaeva F.Sh. Experimental Sugary In Diabetes of the Liver Structure to the Situation P. Major L. From the Plant Separate Received Polyphenols of Substance Effect// Miasto Przyszłości (ISSN: 2544-980X) PublisherKielce: Laboratorium Wiedzy Artur Borcuch ISSN-L2544-980X E-ISSN2544-980X IF (Impact Factor)11.43 / 2024 Websitehttps://miastoprzyszlosci.com.pl/index.p… Vol. 53 (2024): Miasto Przyszłości 234-238 p.
12. R. R. Makhmudov, Tukhtaeva F.Sh. N.M.Yuldashev Study of the Anti-Diabetes Activity of Polyphenols Contained in Plantago Major L. Plant// International Journal of Virology and Molecular Biology 2022, 11(4): 50-54 DOI: 10.5923/j.ijvmb.20221104.02
13. F.Sh.Tukhtayeva., Тухтаев Шоназар Ходжиевич Исследование влияния суммы полифенолов, выделенных из plantago lanceolata l., на динамику содержания инсулина и с-пептида в крови при аллоксановом диабете Vol. 7 No. 1 (2026): ILMIY TADQIQOTLAR VA YANGI OLAM https://conferns.com/index.php/ilm/article/view/1168 337-339 b,

14. F.Sh.Tukhtayeva., Tukhtayev Shonazar Hojiyevich Investigation of the effects of total polyphenols isolated from plantago lanceolata l. on the dynamics of blood insulin and c-peptide levels in alloxan-induced diabetes https://imrconf.com/index.php/GTSI/article/view/3875/3239 Vol. 7 No. 3 (2026): GLOBAL TRENDS IN SCIENCE AND INNOVATION 409-411 b.
15. F.Sh.To`xtayeva., Z.Sh. Sobirova Assessment Of The Biochemical Correction Mechanisms Of The Uzbek Flora Plant Plantago Lanceolata L. Under Experimental Diabetes Conditions/ Educator Insights: A Journal of Teaching Theory and Practice Volume 01, Issue 11, November 2025 brightmindpublishing.com ISSN (E): 3061-6964 Licensed under CC BY 4.0 a Creative Commons Attribution 4.0 International License. 128-137 bet
16. 1.F.Sh.Tukhtayeva., Gulnihol I. Sharipova, Muxabbat Arsenova, Abdumalik Rizayev, Odilbek uglu V. Sapayev, Durdona Azimova, Farrukh Akchayev, Gairat U. Lutfullaev, Abdugani Suyunov, Gulomidin M. Khodzhimatov Evaluation of male rats' genital system alterations caused by cadmium with consumption of total methanolic extract of orange peel Caspian Journal of Environmental Sciences, Vol. 23 No. 5 pp.1225-1232 Received: April 15, 2025 Revised: Aug. 03, 2025 Accepted: July 06, 2025 DOI: 10.22124/cjes.2025.8812
17. 2.F.Sh.Tukhtayeva., M. Kholikova, D. Babakhanova, D. Mirzaeva, E. Abdrashitova, F. Alimova, S. Irgasheva , And D. Jovlieva Soybean Germplasm Evaluation For Protein And Oil Content Planted As A Repeat Crop In Uzbekistan/ SABRAO Journal of Breeding and Genetics 57 (6) 0-0, 2025

http://doi.org/10.54910/sabrao2025.57.6. http://sabraojournal.org/
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