Ideal Journal of Multidisciplinary Research
ISSN (E): 3054-3339
Volume 01, Issue 04, April, 2026
Website: https://researchiapress.com

MORPHOFUNCTIONAL CHANGES IN THE LIVER UNDER CONDITIONS OF EXPERIMENTAL HYPODYNAMIA FOR 30 DAYS

Nortaeva Nilufar Abdirakhimovna
Senior Lecturer, PhD, Tashkent State Medical University

Sobirova Gozal Zafar kizi
Master Student, Tashkent State Medical University

Abduvakhobov Bekhruzbek Ma'rifjon o'g'li
Student, 2 - Faculty of Medicine,
Tashkent State Medical University

Tursunova Sevinch Rustamovna
Student, 2 - Faculty of Medicine, Tashkent State
Medical University, Tashkent, Uzbekistan

Abstract

This study investigates the morphological and functional changes in liver tissue under conditions of hypodynamia (physical inactivity). The aim was to determine the effects of prolonged physical inactivity on the structure of hepatocytes, blood circulation, and liver function. Hypodynamia significantly affects metabolism, blood circulation, and redox processes in the body, leading to pathological alterations in the hepatic parenchyma.

Keywords: Hypodynamia, liver, hepatocyte, dystrophic changes, histology, morphometry, fatty degeneration, liver enzymes, hypoxia.

Introduction

The liver is one of the most important metabolic organs in humans and animals, performing protein, fat, and carbohydrate metabolism, detoxification, and storage functions. Prolonged hypodynamia leads to a decrease in blood circulation, hypoxia,

Ideal Journal of Multidisciplinary Research
ISSN (E): 3054-3339
Volume 01, Issue 04, April, 2026
Website: https://researchiapress.com

and disturbances in lipid metabolism, which cause dystrophic changes in the liver. Therefore, studying morphofunctional alterations in hepatocytes under conditions of hypodynamia is essential for understanding adaptive mechanisms in such conditions.

Materials and Methods

The research was conducted on white laboratory rats weighing 180–200 g. The animals were divided into two groups: 1) Control group – animals with free movement; 2) Experimental group – animals kept under hypodynamic conditions for 7, 14, and 21 days. At the end of each period, liver samples were taken and fixed in 10% neutral formalin, embedded in paraffin, and sectioned at 5 µm. The sections were stained with hematoxylin and eosin (H&E), PAS reaction, and Sudan III stains. Microscopic analysis was performed using a Leica light microscope. Morphometric parameters such as hepatocyte diameter, sinusoidal width, and central vein diameter were measured.

Results:

Under hypodynamic conditions, the following changes were observed in the liver tissue:

- After 7 days of hypodynamia: hepatocytes showed nuclear condensation and cytoplasmic vacuolization. Sinusoids were narrowed and poorly filled with blood.
- After 14 days: signs of fatty degeneration appeared; small lipid droplets accumulated in the cytoplasm. Blood stasis was observed around central veins.
- After 21 days: marked dystrophic changes developed; hepatocytes had pyknotic nuclei, mitochondrial damage, and focal necrosis. Sinusoids were dilated and filled with stagnant blood. Biochemical analysis showed an increase in liver enzyme activity (ALT, AST), indicating hepatocellular injury. The glycogen content decreased, while lipid accumulation increased. These changes were associated with intensified oxidative stress in hepatocytes.

During hypodynamia, reduced blood flow leads to oxygen deficiency in the hepatic parenchyma, causing disturbances in energy metabolism. As a result, lipids accumulate in hepatocytes, mitochondrial activity decreases, and cell membranes are damaged. These processes cause a decline in liver function, impairment of detoxification ability, and disruption of the redox balance. The longer the period of hypodynamia, the more irreversible these morphological changes become.

Ideal Journal of Multidisciplinary Research
ISSN (E): 3054-3339
Volume 01, Issue 04, April, 2026
Website: https://researchiapress.com

Conclusion:

Hypodynamia induces profound morphofunctional changes in liver tissue characterized by: fatty degeneration and vacuolization of hepatocytes; narrowing of sinusoids and blood stasis in central veins; increased activity of liver enzymes; decreased glycogen content. These alterations are directly related to hypoxia, circulatory disturbance, and metabolic imbalance resulting from hypodynamia. The results demonstrate that restricted physical activity adversely affects liver function and, if prolonged, leads to pathological liver conditions.

References

1. Akhmedova S.M., Nortaeva N.A., Nortaev A.B. Morphological changes in the teeth of adolescent children with hypotireosis // Collection of materials of the scientific and practical conference with international participation, dedicated to the 100th anniversary of the Tashkent Medical Academy, "100 years of the Tashkent Medical Academy – the era of great achievements and discoveries". Tashkent, 2022 -P. 199-200
2. Nortaeva N.A., Akhmedova S.M., Nortaev A.B. Morphological changes in the teeth adolescent children with hypotireosis // Problems of biology and medicine. - Samarkhand, 2022. - P 270. ISSN 2182-5674, https://doi.org/10.38096/2181-5674.2022
3. Nortaeva N.A., Nortaev A.B. Morphological changes in teeth against the background of experimental hypothyroidism // Topical issues of modern scientific research.-Dushanbe 2022.-P 168.
4. Nortaeva N.A., NortaevA.B. Morphological changes in the tooth in experimental hypothyroidism // Issues of innovative development of science, education and technology. - Andijan, 2022.-P 273-275
5. Nortaeva N.A., Nortaev A.B., Akhmedova S.M. To study the morphological changes in the tooth against the background of experimental hypothyroidism // Current problems of microbiology. - Tashkent, 2022 -P. 148-152
6. Nortaeva N.A. Morphological changes in teeth as a result of malnutrition in preschool children // Proceedings of the conference dedicated to the 95th anniversary of academician, morphologist, scientist Komiljon Zufarov. - Tashkent, 2021 -P. 34-36

7. Nortaeva N.A., Akhmedova S.M. Morphological changes in the dental in experimental hypotireosis // Collection of materials of the scientific and practical conference of young scientists with international participation, dedicated to the 100 th anniversary of the Tashkent Medical Academy, «innovative approaches in medicine». Tashkent, 2022 -P. 51
8. Nortaeva N.A., Akhmedova S.M., Nortaev A.B. Anthropometric indicators of the maxillofacial system in school–aged children with hypothyroidism // Modern scientific research topical issues, achievements and innovations. Current scientific issues, current affairs, achievements and innovations. Penza, 2023 –P. 153. ISBN 978-5-00173-707-0
9. Nortaeva N.A., Akhmedova S. M., Nortaev A.B., Rajabov B.M. Changes in the face-jaw system of experimental hypothyroidism // Texas Journal of Medical Science https://zienjournals.com 2023 –P. 61-64 ISSN NO: 2770-2936
10. Nortaeva N., Akhmedova S., Berdiev O., Anthropometric dimensions of the maxillofacial system in children with hypothyroidism aged 8-16 year // Journal of Medicine and Innovations www.tsdi.uz 2023 –P. 230-235 ISSN 2181-1873
11. Nortaeva N.A.,Akhmedova S.M.,Nortaev A.B, Effects of hypothyroidism on the maxillofacial system // Uzbek journal of case reports 2023 –P.126, Том 3. https://doi.org/10.55620/ujcr.3.sp.2023
12. 1. Usmanov R.Dj., Gulmanov I.D., Nortaev A.B. Development and prevalence of periodontal diseases in workers working with chemical paints // 100 years of the Tashkent Medical Academy – the era of great achievements and discoveries – 2022. P-244.
13. 2. Saidov A.A. Periodontal disease and its prevention in workers of the textile industry // Monograph-2020. 134 p.
14. 3. Volozhin A.I., Filatova E.S., Petrovich Y.A. and others. Evaluation of the state of the periodontal by the chemical composition of the environment of the oral cavity // Dentistry. -2000. №1- P. 13-16.
15. 4. Nortaev A.B., Rajabov B.M., Berdiev O.V. Oral inflammation in light industry workers // Texas Journal of Medical Science ISSN NO: 2770-2936. - 2023. P-84-86. https://zienjournals.com
16. 5. Nortaev A.B.,Usmanov R.Dj.,Nortaeva N.A. Periodontal disease and its complications in 21-30-year-old chemical paint workers // Journal of medicine and innovations ISSN 2181-1873 2023.P-215-220 www.tsdi.uz

Researchia Press ESTD.2026 Peer Reviewed E Journals
Ideal Journal of Multidisciplinary Research
ISSN (E): 3054-3339
Volume 01, Issue 04, April, 2026
Website: https://researchiapress.com

17. Nortaev A.B.,Usmanov R.Dj., Berdiev O.V. Use of cefixime in the treatment of periodontal disease in industrial employees // Farmaecutil journal №3, 2023 P. 77-80 UDK: 616.314.18-002.4-885:615.331:323.329
18. Nortaev A.B.,Usmanov R.Dj.,Ibragimova Sh.A. Severe Consequences of the Development of Periodontal Disease in the Example of Employees Working in Light Industrial Plants // Texas Journal of Medical Science ISSN NO: 2770-2936 https://zienjournals.com Date of Publication:06-05-2023 P- 110-113
19. Nortaev A.B., Usmanov R.Dj., Berdiev O.V. Periodontal disease and its complications in 21-30-year-old chemical paint workers // Journal of oral medicine and craniofacial research Samarkhand - 2023. P.-21
20. Nortaev A.B., Akhmedova S.M., Usmonov R.Dj. Periodontal disease and its development in the case of employees of chemical shops // Uzbek journal of case reports Part 3. Samarkhand - 2023. P.-130
21. Nortaev A.B., Usmanov R.Dj., Rajabov B.M. The level of periodontal disease in 20-28-year-old textile industry workers // 77th International Scientific and Practical Conference "Achievements of Fundamental, Applied Medicine and Pharmacy". Samarkhand - 2023. P.-525
22. Nortaev A.B.,Usmanov R.Dj.,Gulmanov I.Dj. Etiology of the development of periodontal disease in workers of the manufacturing industry // "Current aspects of the pathogenesis of diseases caused by environmental factors" Materials of international scientific and practical conference Tashkent – 2023. P-11-12