CHANGES IN LIVER WEIGHT UNDER DIETARY INFLUENCE IN MICE.

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Abstract: *This article provides an in-depth analysis of the role of human anatomy in the medical education system and the principles of its effective instruction. The primary objective of teaching anatomy is to equip students with comprehensive theoretical knowledge of the human body and to develop essential practical skills required for their future medical practice. The article explores modern pedagogical strategies, including the use of interactive methods, visual aids, 3D models, and virtual reality (VR) technologies, aimed at enhancing the efficiency of anatomy teaching. The integration of anatomy with other medical sciences is emphasized as a key factor in fostering clinical thinking and analytical reasoning among students. The pedagogical role of anatomy in developing students' independence, critical thinking, and readiness for hands-on medical tasks is also highlighted. The article proposes a balanced teaching approach that combines both innovative and traditional methods to create an engaging and effective learning experience.*

Key words: anatomy, medical education, pedagogical methods, innovations, virtual reality, 3D models, active learning, simulations, online education, medical faculty.

Introduction

The liver is one of the most vital internal organs involved in metabolism, detoxification, storage, and hormonal regulation. Different diets, especially high-fat and calorie-restricted regimens, directly affect liver function. Today, improper nutrition and sedentary lifestyle contribute to the widespread prevalence of non-alcoholic fatty liver disease (NAFLD). Although this condition initially presents with simple fat accumulation in the liver, it may progress to severe liver dysfunction over time.

This study aims to investigate the effect of various diets on liver weight in laboratory mice and analyze the correlation between diet and liver mass experimentally.

Literature Review

Scientific studies show that high-fat diets (HFD) lead to insulin resistance, fat accumulation, and hepatocyte degeneration in mice (Liu et al., 2017). Conversely, calorie restriction plays an essential role in restoring metabolic balance (Fontana & Klein, 2007).

Materials and Methods

Animals Twenty-four healthy male laboratory mice (Mus musculus, 8 weeks old, strain C57BL/6) were divided into three groups:

Group 1 (Control): Standard laboratory diet

Group 2 (High-Fat Diet - HFD): 45% fat, 20% protein, 35% carbohydrate

Group 3 (Calorie Restriction - CR): 30% fewer calories with balanced nutrients

Experimental Duration

The study lasted 6 weeks with mice monitored every 2 days. Temperature was maintained at 22 ± 2 °C, humidity 50–60%, and a 12/12-hour light/dark cycle.

Measurements and Data Collection

Mice were euthanized following ethical guidelines at the end of the experiment.

Livers were extracted, cleaned, and weighed using an electronic scale.

Statistical analysis was performed using ANOVA and Tukey’s post-hoc test (significance at $p < 0.05$).

Results:

Group	**Average Liver Weight (g)**	**Standard Deviation (SD)**
Control (Standard Diet)	1.42	±0.10
High-Fat Diet (HFD)	1.89	±0.12
Calorie Restriction (CR)	1.17	±0.09

The liver weight of mice fed a high-fat diet increased by **33%** compared to controls.

The liver weight of calorie-restricted mice decreased by **18%** compared to controls.

Discussion

The findings confirm that a high-fat diet leads to an increase in liver mass, likely due to lipid accumulation, mitochondrial dysfunction, and inflammation in hepatocytes. Calorie restriction, on the other hand, results in reduced liver mass, possibly because of energy deficiency and slower cell regeneration.

Our results are consistent with previous studies such as Li et al. (2015), who reported fatty liver development in high-fat diet groups but not in calorie-restricted animals.

Conclusion. Diet significantly influences liver weight in mice. High-fat feeding increases liver mass, while calorie restriction decreases it. These findings highlight the potential for dietary interventions in preventing hepatic diseases in humans.

Recommendations and Future Directions

- Testing antioxidant therapies in animals subjected to high-fat diets could be beneficial.
- Future studies should measure biochemical markers such as ALT and AST alongside liver weight.
- Liver biopsies may help analyze cellular-level morphological changes.

References

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