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ДИЕТА С ВЫСОКИМ СОДЕРЖАНИЕМ ЖИРОВ И УГЛЕВОДОВ ВЫЗЫВАЕТ ХРОНИЧЕСКОЕ ПОВРЕЖДЕНИЕ ПОЧЕК, НАРУШАЯ ФУНКЦИЮ ПОЧЕК, КАСПАЗУ-3, ОКИСЛИТЕЛЬНЫЙ СТРЕСС И ВОСПАЛЕНИЕ.

Аннотация: Целью исследования было оценить, как диета с высоким содержанием жиров, углеводов и белков влияет на почки крыс. Четыре группы крыс были случайным образом распределены: контрольная группа; группы, которые получали пищу с высоким содержанием жиров, углеводов и белков; и другая группа. По сравнению с контрольной группой, не было никаких заметных изменений в биохимических и гистопатологических показателях при диете с высоким содержанием белков.

Ключевые слова: углеводы, хроническое поражение почек, каспаза-3, окислительный стресс, высокое содержание жиров, высокобелковая пища, токсичные радикалы.

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HIGH-FAT AND CARBOHYDRATE DIET CAUSED CHRONIC KIDNEY DAMAGE BY DISRUPTING KIDNEY FUNCTION, CASPASE-3, OXIDATIVE STRESS AND INFLAMMATION

Resume: The objective of the study was to assess how a diet high in fat, carbs, and protein affected the kidneys of rats. Four groups of rats were randomly assigned: the control group; the groups that received high-fat, high-carbohydrate, and high-protein meal; and the other group. In comparison to the control group, there were no appreciable changes in biochemical and histopathological in the protein-rich diet.

Key words: carbohydrate, chronic kidney damage, caspase-3, oxidative stress, high fat, high-protein meal, toxic radicals.

Abstract

The objective of the study was to assess how a diet high in fat, carbs, and protein affected the kidneys of rats. With ethical committee consent, 10 rats that were raised at Samarkand State Medical University laboratory were used for the investigation. Four groups of rats were randomly assigned: the control group; the groups that received high-fat, high-carbohydrate, and high-protein meal; and the other group. Following the applications, blood samples were taken and the rat kidney tissues were extracted by laparoscopy while the rats were sedated.

The application of a fat-rich and carbohydrate-rich meal for 13 weeks exhibited detrimental effects on renal function tests, inflammatory indicators, oxidative stress index, histology, and immunohistochemistry. results for caspase-3 in rat kidney tissues, particularly in the group that consumed carbohydrates as opposed to the control group. In comparison to the control group, there were no appreciable changes in biochemical and histopathological in the protein-rich diet. Increased oxidative stress was observed in the renal tissues of rats fed a diet high in fat and carbohydrates. Chronic kidney tissue damage resulted from nephrotoxicity, which was caused by oxidative stress. A diet richer in protein and more balanced than one heavy in sugar and fat could be recommended as a way to prevent chronic kidney impairment.

Introduction

Among the most vital organs are the kidneys. Their duties include cleansing and filtering blood waste and excreting extra fluid in the form of urine. In addition, the kidneys support bone health, blood pressure regulation, red blood cell synthesis, and blood acid-base balance to prevent hyperacidity [1], [2]. Kidneys excrete a variety of waste products from production and destruction, including water, urea (a byproduct of the breakdown and synthesis of proteins), and uric acid (a byproduct of the synthesis and destruction of nucleic acids). Free radicals are also waste products produced during the breakdown of protein, fat, and carbohydrates due to their reaction with oxygen and the synthesis of ATP.

These radicals include the hydroxyl radical (OH), superoxide radical (O₂), hydrogen peroxide (H₂O₂), nitric oxide (NO), and lipid peroxy (LOO) [3]. Free radicals tend to react with other cellular molecules due to their single electron and could lead to cellular damage due to the chain reaction they induce [4], [5], [6], [7].

These wastes cause renal failure because they are unable to be eliminated. Particularly in its early stages, chronic kidney disease (CKD) generally goes undetected and advances slowly. Each nation, ethnicity, gender, age, and age group has a different cause of chronic kidney disease (CKD) [8, 9, 10]. Currently, diabetes and hypertension are the most common underlying causes of chronic kidney disease (CKD), while glomerulonephritis was once the main cause of the condition. Renal failure and other severe issues affecting all organs are caused by a critical loss of kidney function. Around 2 million patients worldwide now need kidney transplants and dialysis. It is anticipated that within the next ten years, this number would quadruple, and the entire treatment bill will surpass one trillion dollars.

Which, in the near future, will have a substantial financial impact, placing a burden on affluent countries' health budgets and causing more serious issues in low-income countries.

Materials and method

The rats used in the study were bred at the Samarkand Medical University Laboratory. Rats that were 21 days old and weighed 40 g on average were chosen. 10 rats were used in the investigation, as determined by the power analysis results. Prior to and throughout the experiment, rats were housed at the 22 ± 2 °C temperature in rooms with seasonal daylight rhythm and ventilation in the Samarkand Medical University Laboratory.

Result

The results of the biochemical analysis showed that the control group differed from the fat, carbohydrate, and SOD groups on all oxidation parameters (MDA, GSH, CAT, and GSH-Px), and that the control group and the protein groups differed on MDA, GSH, and CAT parameters (Table 2). As measured by the oxidative stress index (TAS, TOS, OSI), the control group differed from the fat and carbohydrate groups, but not from the protein group.

Discussion

In general, unpaired electrons in atomic or molecular orbits produce highly reactive chemical reactions known as free radicals. Usually, single electron transfer by the oxidases or electron transfer within the respiratory system of the mitochondria produces the unpaired electron. The homolytic breakup of molecular bonds and the transfer of each electron to a different atom is another

mode of synthesis [28]. Reactive oxygen species (ROS) are a subset of these radicals that include free radicals.

In conclusion

In summary, chronic kidney disease (CKD) is a prevalent ailment that has a significant risk of morbidity and mortality. It also adversely impacts quality of life, places a strain on healthcare resources, and lacks public awareness, making early identification a challenge. In order to prevent CKD, eating a healthy, balanced diet is essential. Food items that are processed, fried, and high in sugar and fat should be avoided. Rather, one should eat fruits, vegetables, and meats on a daily basis.

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