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Compatibility Between Hyperuricemia, Hypertension, Diabetes Mellitus, and Hyperlipidemia- Study Case

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1. Abstract

Hyperuricemia is a disease that arises as a result of a defect in the metabolism process, leading to an increase in its production and accumulation in the blood, with the inability to excrete it in the urine through the kidneys. It has been found that people who suffer from a problem in metabolism, such as patients with diabetes or high blood fats, or patients with high blood pressure suffer from high uric acid. In this article, we find that a woman suffering from diabetes and high blood pressure, by measuring blood lipids and uric acid, their rates were high.

This study was designed to relate the relationship between hyperlipidemia, diabetes mellitus, blood pressure, and uric acid.

The results showed that there is a linear relationship between high uric acid in the blood and high FBS, total cholesterol, triglycerides, LDL- Cholesterol, in addition to high blood pressure. In contrast, inversely relationship between high blood uric acid and HDL-Cholesterol.

Uric acid may be considered an independent risk factor for patients with a metabolic disorder.

2. Background

Hyperuricemia is a condition that arises from high levels of uric acid in the blood. Uric acid is the final product of a purine nitrogenous base metabolism [1].

Uric acid rises, either for physiological or pathological reasons, either as a result of consuming large quantities of purine, such as consuming large quantities of the liver or spleen, and pathological causes as a result of the kidneys' failure to get rid of excess uric acid [2].

High uric acid may accompany other diseases such as high blood pressure, hyperlipidemia, kidney failure, diabetes, metabolic syndrome [3].

With high uric acid, the accumulation of crystals occurs in the joints, which causes gout, which results in excruciating pain and difficulty in movement and may develop into that the joint may lose its function due to the inflammation that occurs in the tissues [4-5].

Hyperlipidemia is a disease that arises as a result of high fats in the blood, which includes (total cholesterol, triglycerides, LDL- Cholesterol with a deficiency of HDL-Cholesterol) [6]

Scientific research has proven that there is a relationship between high uric acid and high total cholesterol, triglycerides, LDL-Cholesterol, with an inverse relationship between uric acid and HDL-Cholesterol [7]

3. Objective

The aim of the study was to determine the relationship between hyperuricemia and hyperlipidemia, diabetes mellitus, and hypertension.

4. Case Report

55-Years old woman was diagnosed with diabetes mellitus type II, hyperlipidemia, hypertension, and hyperuricemia in 2020. She

presented to hospital in July 2020 with 2 month history of anorexia, thirsty, headache, polyuria, swollen in joints and easy fatigability. Physical examination was positive for hypertension, joints swollen, lose weight. To diagnose the patient, she was sent to the laboratory for some tests (uric acid, total cholesterol, triglycerides, HDL- cholesterol, LDL- cholesterol, and fasting blood sugar) and she was assured of fasting for 10 hours.

Lab tests on presentation showed: Total cholesterol of 315mg/dL, triglycerides 350 mg/dL, HDL- cholesterol 35 mg/dL and LDL-cholesterol 199 mg/dL, FBS 250 mg%. S. uric acid level is 10.5 mg%. SBP 160 mmHg and DBP 100 mmHg.

5. Discussion

From this study, it was found that there was a relationship between high uric acid and high total cholesterol, triglycerides, and LDL-cholesterol, and on the other hand, there was a decrease in the level of HDL- cholesterol. This was in agreement with the study conducted by Sarmah and Sharma, in which it was explained that by studying the relationship between the level of uric acid and the lipid profile on 60 volunteers, it was found that there is a relationship between the level of uric acid and the levels of bad and good cholesterol [8].

In this study we found that the occurrence of a defect that led to a high level of uric acid is associated with hyperlipidemia and that this is associated with coronary artery disease and this is due to the fact that there is a linear relationship between high levels of uric acid and Apo lipoprotein-B. Apo lipoprotein-B is considered a prognostic factor for coronary artery disease [9].

In this case, there was an indirect relationship between diabetes and high uric acid. This is due to the fact that high Apo lipoprotein-B leads to insulin resistance and this condition is present in diabetic patients and this reduces eGFR and reduces uric acid excretion rates through the urine, which contributes to the accumulation of Uric acid in the blood, its elevation, and hyperuremic events [10].

There is another mechanism to clarify the relationship between uric acid and diabetes, as uric acid increases monocyte chemoattractant protein 1 and reduces adiponectin production, which leads to insulin resistance and infections [11].

Peng et al, he determined that there is a correlation between high cholesterol and triglycerides, while there is a negative relationship between uric acid and good cholesterol [12].

Raijmakers et al. Triglycerides have been shown to be an unapproved risk factor for hyperuricemia. Takahashi et al decided that there was a link between triglycerides and gout [13].

The relationship between high uric acid and high blood pressure is due to two possibilities. The first possibility is that deposition of uric acid on the walls of blood vessels activates renin-angiotensin, thus reducing the release of carbon dioxide, which narrows it and works on blood viscosity, which causes high blood pressure. The second possibility is that the oxidative stress of uric acid raises blood pressure [14-16].

This agrees with Nurshad et al, study that stayed that there was correlation between hyperuricemia and hypertension [6].

6. Conclusion

This research shows that high uric acid depends on several factors, including age, diet, diabetes, and high blood lipids. The analysis of uric acid in the blood is the analysis available and inexpensive, through which it is possible to predict coronary artery disease. There is a linear relationship between high uric acid, triglycerides and bad cholesterol, while there is an inverse relationship between high uric acid and good cholesterol. The increase in uric acid in diabetic patients is due to insulin resistance and the presence of fat cells.

Medicines to get rid of uric acid accumulated in the blood depend on increasing uric acid excretion from the kidney through urine and reducing reabsorption.

Uric acid is an independent risk factor for hyperlipidemia, coronary artery disease and diabetes.

7. Patient Consent

Written informed consent was taken from the patient during his hospital stay.

8. Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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