Investigating the Plasma Concentration of Metoprolol in Hypertensive Patients Using Gas Chromatography with a Flame Ionization Detector at Seyed Al-Shohada Hospital of Urmia

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Citation:
Zarghami Soltan Ahmadi E, Shiva A, Khademvatani K, Vardast MR. Investigating the Plasma Concentration of Metoprolol in Hypertensive Patients Using Gas Chromatography with a Flame Ionization Detector at Seyed Al-Shohada Hospital of Urmia. *Iranian biomedical journal*. Supplementary (12-2024): 55.

ABSTRACT

Introduction: Hypertension is a significant risk factor for coronary heart disease and cerebrovascular disease that causes mortality, morbidity, and considerable economic costs. It is an asymptomatic disease that is sometimes called the silent killer. Metoprolol is one of the most widely used medications for treating cardiovascular diseases. Various methods are used in clinical laboratories to determine the concentration of medications in biological fluids and monitor treatment. Among these methods are gas chromatography or high-performance liquid chromatography. Gas chromatography is a technique that separates very complex mixtures based primarily on boiling point/vapor pressure differences and polarity. This study aimed to determine the plasma concentration of metoprolol using a gas chromatography device with a flame ionization detector (FID) in patients with hypertension referred to Seyed al-Shohda Hospital in Urmia.

Methods and Materials: This quasi-experimental study included 25 patients with hypertension. The patients' basic information was recorded using a standardized checklist. Then, a venous blood sample was obtained from patients in a steady state. Gas chromatography FID measured the plasma concentration of metoprolol.

Results: The linear range obtained from gas chromatography results was 1-500 µg/lit. The limit of detection and was 0.2 µg/L, and the limit of quantification was 1 µg/L. The mean ± standard deviation of concentration for hospitalized patients was 25.62 ± 18.78.

Conclusion and Discussion: A major global health problem in treating diseases such as diabetes, hypercholesterolemia, and hypertension is overtreatment or undertreatment of patients; for instance, overtreatment of hypertension can lead to hypotension as well as drug toxicity. The results of this study show that the plasma concentration of the metoprolol was different in each patient, and gas chromatography is an effective and cost-effective method for determining the concentration of medications, which can be used to personalize treatment. However, to validate the results, it is essential to study a larger cohort of patients.

Keywords: Gas chromatography, Hypertension, Metoprolol, Plasma

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[DOI: 10.61186/ibj.25th-11th-IACRTIMSS]