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A Case Report

**A CASE REPORT OF SEVERE HYPERKALEMIA  
ASSOCIATED WITH COMBINATION THERAPIES FOR  
CHRONIC HYPERTENSION ALONG WITH OBESITY AND  
TYPE II DIABETES**Noor-ul-Ain<sup>1\*</sup>, Laiba Arooj<sup>2</sup>, Sana Saeed<sup>3</sup>

<sup>1\*</sup>Department of Pharmacology, Government College University Faisalabad, <sup>2</sup>Department of Pharmacology, Government College University Faisalabad., <sup>3</sup>Department of pharmacy, The University of Faisalabad, Pakistan

**Article Received:** December 2022    **Accepted:** December 2022    **Published:** January 2023**Abstract:**

*Hyperkalemia associated with the antihypertensives is a leading condition among the hypertensive individuals especially those who are suffering from chronic hypertension and other metabolic disorders like diabetes mellitus and obesity. The combination of therapies of high dose of Hydrochlorothiazide, Valsartan and Amlodipine for last two years given to the patient leads to severe adverse effects some of which are irreversible. In this case a female patient of age 62 years appeared in emergency with severe vomiting, nausea, SOB (shortness of breath), pulmonary edema and arrhythmia. ECG shows prolongation of the PR and QRS intervals, and her laboratory reports were showing increased creatinine, serum urea level and a very high potassium level. She was given symptomatic treatment to treat her symptoms and later on she was undergone hemodialysis to remove the excessive potassium from her body and she got recovered later on.*

**Key words:** Associated, combination, high dose, Irreversible, Excessive.

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**INTRODUCTION:**

Hypertension, also called High blood pressure, is a condition in which blood pressure that is higher than normal this can be primary or essential hypertension and secondary hypertension. Having blood pressure measures constantly above normal may possibly result in a diagnosis of high blood pressure (or hypertension) [1][2]. Hypertension is the most common disease in the world and it is also a leading cause of cardiovascular morbidities and increased mortality rate throughout the world. Obesity is one of the leading underlying factor of hypertension and other metabolic disorders like type II diabetes mellitus and hyperlipidemia.

All of these conditions are managed by lifestyle modifications and medical treatment to avoid severity of such conditions. The treatment protocols of such diseases are given by health organizations like FDA and WHO [3]. But when all these conditions are treated with combinations of drugs then severe adverse effects occur. Since Hypertension can be treated with single therapy, double therapy or triple therapy and the 4 major classes of antihypertensives that are used in combination therapy for the treatment of hypertension includes thiazide diuretics, angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) and calcium channel blockers.

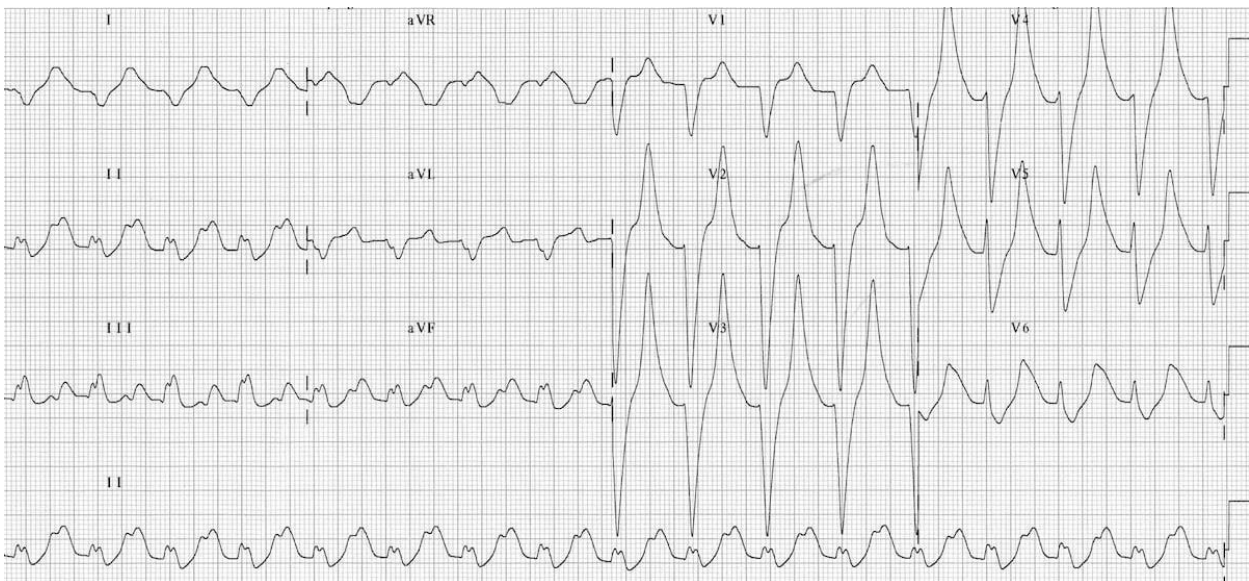
ACEIs and ARBs should not be used concurrently. If the patient has some other diseases like type II

diabetes mellitus and deranged lipid profile given the oral hypoglycemic agents or exogenous insulin therapy and anti-hyperlipidemic like HMG CoA reductase inhibitors etc [4][5]. Then careful monitoring of vitals and the frequent laboratory examinations are mandatory to avoid severe adverse effects like hyperkalemia, hyponatremia etc which leads to the death of patient.

**Case presentation:**

A 62 years old female patient came to emergency with symptoms of severe vomiting, nausea, SOB (shortness of breath), pulmonary edema, cerebral edema, arrhythmia and with loss of consciousness. She had history of chronic hypertension of last 20 years and type II diabetes mellitus for last 15 year and myocardial infarction 7 years back and she had deranged lipid profile. She had family history of hypertension and type II diabetes mellitus. Her treatment regimen was Valsartan, Hydrochlorothiazide, Amlodipine as a combination for hypertension for last 2 years and she was given with exogenous insulin of 30 and 40 units in the morning and evening respectively. For her lipid profile cardiac events she was prescribed Atorvastatin metoprolol and Loprin (Aspirin). But she had sudden attacks of vomiting, nausea, SOB (shortness of breath), pulmonary edema, cerebral edema, arrhythmia. When she arrived emergency her vitals were checked and she was given symptomatic treatment. ECG showed prolongation of the PR and QRS intervals.

**Fig1: ECG of patient showing hyperkalemia**



Laboratory reports of patient showing hyperkalemia and high level of serum urea and creatinine and these were frequently checked daily to assess the level of patients' condition. Ultrasound of kidney and urinary bladder was

done. Chest x-ray was done to see lungs because patient had Shortness of breath and there was pulmonary edema in her x- ray report.

Sr	Tests	Day 1	Day 2	Day 3	Day 5	Day 7	Day 10	Day 12
1	Plasma Na	130mEq/L	130mEq/L	132mEq/L	128mEq/L	130mEq/L	135mEq/L	138mEq/L
2	K	8.5mEq/L	8.5mEq/L	7.1mEq/L	6mEq/L	5mEq/L	4.1mEq/L	3.2mEq/L
3	Chloride	98 mEq/L	95 mEq/L	97 mEq/L	90 mEq/L	91 mEq/L	95 mEq/L	98 mEq/L
4	Creatinine	4 mEq/L	4.1 mEq/L	3.7 mEq/L	3.4 mEq/L	3.1 mEq/L	2.7 mEq/L	2 mEq/L
5	Urea	6 mmol/L	5.8mmol/L	5.3mmol/L	5.1mmol/L	4mmol/L	3.9mmol/L	3.1mmol/L

**Table 1: Laboratory data of patient**

Initial treatment that was given to the patient was calcium gluconate to stabilize cardiomyocyte membranes, followed by insulin injection, and b-agonists administration metocloperamide for vomiting and nausea and oxygen facemask to avoid shortness of breath. Later on she was undergone hemodialysis to reduce the serum potassium level. She was observed closely for her symptoms and lab reports were assessed on daily basis. She was undergone six sessions of hemodialysis and she got recovered after fifteen days and discharged with the changes in her daily treatment regimen.

#### DISCUSSION:

Hyperkalemia, or elevated potassium levels in the blood, can be associated with hypertension, or high blood pressure. This can occur due to the use of certain medications, such as ACE inhibitors and potassium-sparing diuretics, which are commonly used to treat hypertension. Additionally, kidney dysfunction, which is a common complication of hypertension, can also lead to hyperkalemia. It is important to monitor potassium levels in individuals with hypertension and to adjust treatment as needed to prevent hyperkalemia [6] [7] [8]. Hyperkalemia can be a potential adverse effect of some antihypertensive medications. Medications that can increase potassium levels in the blood include ACE inhibitors, ARBs (angiotensin receptor blockers), and potassium-sparing diuretics such as spironolactone and amiloride. These medications work by inhibiting the renin-angiotensin-aldosterone system (RAAS), which helps regulate blood pressure and electrolyte balance,

and by decreasing the excretion of potassium in the urine. Hyperkalemia can cause symptoms such as muscle weakness, tingling sensations, and heart arrhythmias, so it is important to monitor potassium levels in patients taking these medications and to adjust treatment as needed[5][6]. Diabetes and insulin therapy can also affect potassium levels in the blood and may increase the risk of hyperkalemia. Hyperkalemia is more common in people with diabetes due to the kidney's diminished ability to remove potassium from the body. Insulin therapy can also contribute to hyperkalemia because it promotes the movement of potassium into cells, which can result in higher potassium levels in the blood. Insulin deficiency or resistance, as seen in diabetes, may also cause hyperkalemia by inhibiting the release of potassium from cells. Additionally, certain medications used to treat diabetes, such as ACE inhibitors, ARBs, and potassium-sparing diuretics, can also increase the risk of hyperkalemia. So, it is crucial for diabetes patients to have regular monitoring of potassium levels, especially if they are on insulin therapy or other medications that may affect potassium levels. Hyperkalemia can have serious effects on cardiac function, as it can disrupt the normal electrical activity of the heart. High potassium levels in the blood can cause the heart to beat irregularly or to stop beating altogether, which can lead to cardiac arrest [8]. Hyperkalemia can also cause other cardiac issues such as Heart block: Potassium ions affect the electrical signals that coordinate the contraction of the heart's chambers. High potassium levels can slow or block these signals, leading to heart block and bradycardia (a

slow heart rate) Arrhythmias: Hyperkalemia can cause different types of arrhythmias such as ventricular tachycardia and ventricular fibrillation which can be life-threatening. Myocardial depression [3] [6]: Hyperkalemia can decrease the strength of the heart muscle contractions, which can lead to myocardial depression, a decrease in cardiac output and blood pressure. It is essential to detect and treat hyperkalemia as soon as possible to prevent these cardiac issues and to avoid the risk of cardiac arrest [5].

**Ethical issue:**

Informed consent was obtained from patient attendant.

**Conflict of interest:**

There is no conflict of interest.

**Acknowledgment:**

None.

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