

Study on prescription pattern of antihypertensive drugs among acute coronary syndrome patients in South Indian population

V. P. Pathmashri¹, V. Vikranth², Dhanraj Ganapathy^{1*}

ABSTRACT

Background: Hypertension or high blood pressure is a condition, in which the force of the blood against the artery walls is too high. The increasing prevalence of the condition is blamed on lifestyle and dietary factors such as physical inactivity, alcohol and tobacco use, and a diet high in sodium. Hypertension can be primary and secondary. Primary hypertension results from a complex interaction of genes and environmental factors. Secondary hypertension results from identifiable cause. Long-term prevalence of this can lead to major health risks. **Aim:** The present study evaluates the drug utilization pattern of antihypertensive drugs in acute coronary syndrome (ACS) patients among South Indian population. **Materials and Methods:** This prospective observational study was conducted for a period of 1 month (December 2016) based on in and outpatient medical records of patients admitted in Saveetha Medical College and Hospital in Chennai. Fifty patients were selected based on inclusion and exclusion criteria. Only patients with ACS and hypertension were included in the study. Non-hypertensive ACS patients and hypertensive patients with no signs of ACS were excluded from the study. The prescription forms were analyzed for various parameters such as gender of the patient, type of antihypertensive drugs used, type of therapy (monotherapy or two drug combination therapies), and other diseases associated with hypertension. **Results:** About 53% of the patients were prescribed amlodipine, 22% of the patients were prescribed atenolol, 20% of the patients were prescribed enalapril, and 5% of the patients were prescribed diltiazem. **Conclusion:** Monotherapy was the most commonly used mode of treatment according to the current study. However, it does not indicate that monotherapy is better or more efficient than the other since the treatment of choice also depends on the severity of the condition and the patient's history. If the patient response to monotherapy is less, then combination therapy is used for better prognosis.

KEY WORDS: Acute coronary syndrome, Antihypertensive drugs, Hypertension, Prescription pattern

INTRODUCTION

“Acute coronary syndrome” (ACS) is a syndrome associated with decreased blood flow in the coronary arteries, leading to improper function or death of the heart muscles. Hypertension is very common in patients with ACS. The type of ACS decides the type of treatment. ACS is not a single disease; it refers to three types of coronary artery diseases that are associated with sudden rupture of plaque inside the coronary artery.

The type of ACS is determined by the location of the block, the duration of time that blood flow is blocked and the amount of damage that has occurred. Hypertension or high blood pressure (BP) is a condition, in which the force of the blood against the artery walls is too high. If the BP higher than 140 over 90 mmHg, then it is considered as hypertension.^[1]

The increasing prevalence of the condition is blamed on lifestyle and dietary factors such as physical inactivity, alcohol and tobacco use, and a diet high in sodium.^[1] Hypertension can be primary and secondary. Primary hypertension results from a complex interaction of genes and environmental factors. Secondary hypertension results from identifiable

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cause. Kidney disease is the most common secondary cause of hypertension.^[2] Long-term prevalence of this can lead to major risk factors. The term ACS refers to any group of clinical symptoms compatible with acute myocardial ischemia and includes unstable angina, non-ST segment elevation myocardial infarction, and ST-segment elevation myocardial infarction. Hypertension can be primary and secondary. Primary hypertension is due to genes and environmental factors. Secondary hypertension results from specific cause.^[2] Long-term prevalence of this can lead to major risk factors. Common causes are excessive intake of alcohol and use of oral contraceptives, which can cause a slight rise in BP, hormone therapy for menopause, etc.^[3] Secondary hypertension can also result from kidney disease, diabetes, Cushing syndrome, hyperthyroidism, hyperparathyroidism, pheochromocytoma, sleep apnea, obesity, and pregnancy.^[3]

High BP increases morbidity in heart failure by causing left ventricular hypertrophy, a thickening of the heart muscle that results in less effective muscle relaxation between heartbeats. This makes it difficult for the heart to fill with enough blood to supply the body's organs, especially during exercise, leading your body to hold onto fluids and your heart rate to increase.^[4]

Hypertension is common with ACS patients. Hypertension or high BP is a serious medical condition. It happens when the force of the blood through the arteries is too strong.^[5-8]

Causes of Hypertension

Hypertension can be caused due to two factors environmental factors and genetic factors. The environmental factors are diet, smoking, stress, and the genetic factors can be classified into mitochondrial genome and nuclear genome. When the mitochondrial genome is affected, then the energy transduction, signaling mechanism is affected and cell death takes place. When nuclear genome is affected the central nervous system, arterial factors and metabolic hormonal factors are affected.^[9-12] All these etiological factors lead to vasoconstriction of blood vessels. Narrowed blood vessels will cause decreased oxygen supply, decreased blood flow to brain, and increased peripheral resistance. Moreover, it causes muscle weakness, irritability, disorientation, dizziness, and increased intravascular pressure, which leads to increased BP more than normal.^[13-15] The present study evaluates the drug utilization pattern of antihypertensive drugs in ACS patients among South Indian population.

MATERIALS AND METHODS

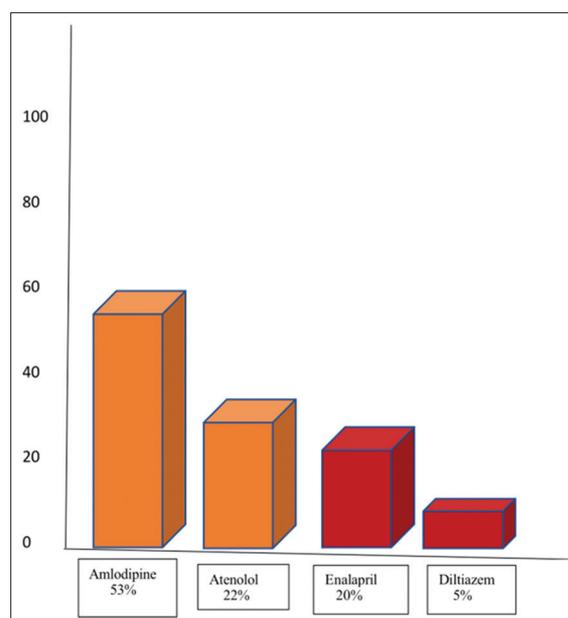
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on in and outpatient medical records of patients admitted in Saveetha Medical College and Hospital in Chennai. Fifty patients were selected based on inclusion and exclusion criteria. Only patients with ACS and hypertension were included in the study. Non-hypertensive ACS patients and hypertensive patients with no signs of ACS were excluded from the study. The prescription forms were analyzed for various parameters such as gender of the patient, type of antihypertensive drugs used, type of therapy (monotherapy or two drug combination therapies), and other diseases associated with hypertension.

RESULTS

About 53% of the patients were prescribed amlodipine, 22% of the patients were described atenolol, 20% of the patients were prescribed enalapril, and 5% of the patients were prescribed diltiazem [Graph 1].

In the combination therapy, the possible combinations used are enalapril and atenolol, enalapril, amlong and atenolol, amlong and atenolol, diltiazem and atenolol, diltiazem, enalapril, and atenolol. In our study, atenolol and enalapril combination was prescribed. Amlong is also a calcium channel blocker. In our study, 29 patients (58%) of the 50 patients underwent monotherapy and the rest 21 patients (42%) underwent combination therapy [Table 1]. The combination drugs in our study are atenolol and enalapril. Combination therapy is suggested to the patients who showed poor prognosis to monotherapy. Monotherapy is first suggested to the patient if the patient does not show any improvement;



Graph 1: The antihypertensive drugs used in acute coronary syndrome patients for treating hypertension. About 53% of the patients were prescribed amlodipine, 22% of the patients were described atenolol, 20% of the patients were prescribed enalapril, and 5% of the patients were prescribed diltiazem

Table 1: Type of drug therapy – monotherapy and combination therapy

Drug therapy	Drug prescribed
Monotherapy	Amlodipine, atenolol, diltiazem
Combination therapy	Atenolol, enalapril

then, the dosage of drugs in monotherapy is increased and even if the prognosis is poor or not good after the raise in dosage and then combination therapy was suggested.

DISCUSSION

Amlodipine a calcium channel blocker blocks the transport of calcium into the smooth muscle cells lining the coronary arteries and other arteries of the body. Since the action of calcium is important for muscle contraction, blocking calcium transport relaxes arterial muscles and dilates the coronary arteries and other arteries of the body.^[16] By dilating coronary arteries, amlodipine increases the flow of blood to the heart and is useful in preventing heart pain (angina) resulting from reduced flow of blood to the heart due to contraction caused by coronary artery spasm. Relaxing the muscles lining the arteries in the rest of the body lowers BP and this reduces the work that the heart must do to pump blood to the body. Reducing the work of the heart also lessens the heart muscle's need for oxygen and thereby helps to prevent angina in patients with coronary artery disease.^[17]

Atenolol is a beta-adrenergic blocking agent that blocks the effects of adrenergic chemicals such as adrenaline or epinephrine, released by nerves of the sympathetic nervous system. One of the important functions of beta-adrenergic nerves is to stimulate the heart muscles to beat more rapidly. By blocking the stimulation by these nerves, atenolol lowers the heart rate and is very useful in treating abnormally rapid heart rhythms. By blocking the stimulation by these nerves, atenolol lowers the heart rate and is very useful in treating abnormally rapid heart rhythms. Atenolol also reduces the force of contraction of heart muscle and reduces the BP. By reducing the heart rate, the force of muscle contraction and the BP against which the heart must pump, atenolol reduces the work of heart muscle and the need of the muscle for oxygen.^[18]

Enalapril, after hydrolysis to enalaprilat, inhibits angiotensin-converting enzyme (ACE) in human subjects and animals. ACE is a peptidyl dipeptidase that catalyzes the conversion of angiotensin I to the vasoconstrictor substance, angiotensin II. Angiotensin II also helps in aldosterone secretion by the adrenal cortex. Inhibition of ACE results in decreased plasma angiotensin II, which leads to decreased vasopressor activity and to decrease aldosterone secretion.^[19]

Beta-adrenergic blocking agents are weak hypertensive drugs so they are used along with ACE inhibitors for more effective results. Thus, atenolol and enalapril are used in combination therapy.

Diltiazem is a non-dihydropyridine calcium channel blocker (vasodilator), increasing blood flow, and variably decreasing the heart rate through strong depression of atrioventricular (AV) node conduction.

It is a vasodilator of coronary vessels and peripheral, which reduces peripheral resistance and afterload. Diltiazem causes a decrease in heart muscle contractility by slowing of the sinoatrial node and a slowing of conduction through the AV node. Each of these effects results in reduced oxygen consumption by the heart, reducing angina symptoms. These effects also reduce BP by causing less blood to be pumped out.^[20]

There are two types of drug therapies used in controlling the BP in ACS patients, which are monotherapy and combination therapy. Monotherapy is the one, in which only one drug is used to control hypertension. Combination therapy is used only if the BP is not controlled in monotherapy. If the monotherapy does not work for a patient, then either the dose of the drug is increased or combination therapy is undergone. In this study, atenolol and enalapril are used in combination therapy. Atenolol is beta-blocker and beta-blockers are weak antihypertensives. Hence, it used along with enalapril which is an ACE inhibitor.

In this study, amlodipine was used more than others. The combination drugs used are atenolol and enalapril. That is, 29 patients (58%) of the 50 patients underwent monotherapy and the rest 21 patients (42%) underwent combination therapy.

About 53% of the patients were prescribed amlodipine, 22% of the patients were described atenolol, and 20% of the patients were prescribed enalapril.

In the mid-1950s, Indian urban population-based epidemiological studies used the World Health Organization criteria for diagnosis of hypertension and reported prevalence of hypertension is 1.2–4.0%. Moreover, since then, the prevalence of hypertension in Indian cities has been steadily increasing from 3.0 to 4.5% in early the 1960s to 11.0 to 15.5% in the mid-90s. Systolic BP >140 mmHg and/or diastolic BP >90 mmHg is the currently accepted diagnostic threshold for hypertension. Many prevalence studies of hypertension defined by current criteria have been performed in the late 20th and early 21st century in India as reviewed earlier.^[21-23] All these studies reveal a high prevalence of hypertension in Indian urban populations. These studies show that almost a third of adult Indian population has high BR; this is similar to

other parts of the developing world and only slightly lower than the developed countries.^[24,25]

CONCLUSION

Monotherapy was the most commonly used mode of treatment according to the current study. However, it does not indicate that monotherapy is better or more efficient than the other since the treatment of choice also depends on the severity of the condition and the patient's history. If the patient response to monotherapy is less, then combination therapy is used for better prognosis.

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