International Journal of Current Science Research
www.drbgrpublications.in

A Study on Prescription Pattern Analysis and the Role of Pharmacist in the Management of Hypertension

Shaik Sameeha Sultana*[1], Mohammed Omer[1], Asnia Fatima[1], Nayyara Siddiqua[1], Dr. Aliya Parveen[2]

[1]Pharm. D student, Nizam Institute of Pharmacy, Deskhmukhi, Yadadri Bhuvanagiri (Dist), Telangana, India.

[2]Assistant Professor, Department of Pharmacy Practice, Nizam Institute of Pharmacy, Deshmukhi, Yadadri Bhuvanagiri (Dist), Telangana, India.

*Corresponding Author Email id: Sami89659@gmail.com

Abstract

Background: Hypertension is a major cause of premature death worldwide. It is an important risk factor for complications of the neurological, cerebrovascular, and renal systems. The growing rate of hypertension and the increasing cost of its care affect the prescribing habits of physicians and patients with the procedure. Therefore, we aim to focus on the usage of antihypertensive drugs.

Objective: To analyze the prescription pattern in hypertensive patients and to assess the anthropometric details associated with increased risk of hypertension. To observe changes in the treatment strategy according to age and co-morbidity.

Methodology: A prospective, observational learning involving analysis of Inpatients and Outpatients of Medicover Hospital, Hyderabad, India diagnosed with Hypertension and other Comorbid conditions using patient data collection form for a study period of 6 months.

Results: Out of a total 300 prescriptions were observed. The majority of the cases were males (57%) and female patients were (43%). Most of them were between the age group of 51-60 years. (5%). Hypothyroid (10%), Diabetes Mellitus, (40%) Chronic kidney disease, (47%) Coronary artery disease were the most common comorbidities. Headache (38%) was the most common symptom. Our analysis shows that monotherapy (92%) was the prescribed drug therapy.

Conclusion: Our study focused on prescription pattern analysis and the role of a pharmacist in the management of hypertension. Males were at more risk than females due to cigarette smoking, alcohol consumption, and high salt intake on daily basis. In general, single-drug

therapy was more prescribed when compared to combination therapy, respectively. ARB's were the most commonly prescribed class of drugs. Hypertension management can be done by adapting pharmacologic choices and lifestyle modification recommendations including exercise are major components to blood pressure control in this population.

Keywords: *Blood pressure, Anti-hypertensives, Lifestyle*.

Introduction

Hypertension, also known as increased or elevated blood pressure. It is a condition in which blood vessels have increased pressure persistently (Ghoushs *et al*., 2020). The 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) defined hypertension as more than 120/90 mm/Hg. (L. Micheal Possey *et al*., 2020) Hypertension is a serious medical condition. It can increase the risk of heart, brain, kidney, and many other conditions. Hypertension is a serious medical condition. It can increase the risk of heart, brain, kidney, and many other conditions. This is a significant cause of worldwide premature death, with the disease being more than 1 in 4 men and 1 in 5 women - over a billion people. Across low and middle-income nations, where two-thirds of cases are reported, the burden of hypertension is felt disproportionately mainly due to elevated risk factors in those populations in recent decades (Ghoush s *et al*., 2020).

Epidemiology

Hypertension is predisposed to several causes. About 7.5 million deaths are caused by high blood pressure, or 12.8 percent of the world's estimated reported deaths. Adults with hypertension are predicted to grow to 1.56 billion by 2025. According to the National Family Health Survey (NFHS-4) results, the prevalence of hypertension, obesity, and blood glucose in the Uttar Pradesh metropolitan area was 10.5%, 23.9%, and 9.9%, respectively (Singh S *et al*., 2017).

Classification of hypertension

The categorization is centered on the average of two or more accurately calculated seated BP readings on each of two or more visits to the office.

- **Prehypertension:** A systolic blood pressure of 120-139 mmHg, an 80–89 mmHg diastolic blood pressure such patients are at higher risk for hypertension development. It is characterized by systemic blood pressure of approximately 140 mmHg or diastolic blood pressure of approximately 90 mmHg. Hypertension is divided into two stages.

- **Stage 1**. This stage includes 140-159 mmHg systolic blood pressure, 90-99 mmHg diastolic blood pressure.
- **Stage 2**. This stage involves patients whose systolic blood pressure is approximately 160 mmHg or diastolic blood pressure is approximately 100 mmHg (Khatib MN *et al*., 2005).

Pathophysiology

There is still a lot of unpredictability about the pathophysiology of HTN. A small-scale number of subjects (between 2% and 5%) have underlying renal or adrenal dysfunction which causes is of their high BP. However, there is no specific single identifiable cause and their condition is classified as "essential hypertension." A variety of physiological mechanisms are involved in maintaining normal BP. This may contribute to the development of critical hypertension.

Risk Factors

Cardiac Output and Peripheral Resistance

Maintaining normal blood pressure depends upon the balance between cardiac output and peripheral vascular resistance. Mostly, patients with critical HTN have average cardiac output, but increased peripheral resistance. It has been believed that peripheral resistance is not elevated in very early hypertension and that an increase in BP is caused by an increase in cardiac output. This is linked to sympathetic overactivity. As a result, a corresponding increase of peripheral arteriolar resistance may develop in a countervailing way to avert the increased pressure from being transferred to the capillary bed where it would have a major impact on cell homeostasis.

Renin-Angiotensin System

The renin-angiotensin system may be most critical of the endocrine systems which influence blood pressure control. The circulating renin-angiotensin system is not believed to be specifically responsible for the increase in BP due to critical hypertension. However, there is growing corroboration that there are substantial non-circulating "local" renin-angiotensin apocrine or paracrine systems that also control blood pressure

Hypercoagulability

Patients with HTN show aberration of the vascular wall, Blood constituents (abnormal levels of hemostatic factors, platelet activation, and fibrinolysis) hence the blood flow (rheology, viscosity, and flow reserve) indicates hypertension accord to prothrombotic or hypercoagulability status.

Endothelial Dysfunction

Vascular endothelial cells play important role in the cardiovascular system. It controls by developing an outspread of potent local vasoactive agents and including vasodilator molecules of gas and vasoconstrictor peptide endothelin. Endothelial dysfunction has been associated with human essential hypertension.

Vasoactive Substances

Many more vasoactive processes and mechanisms influence the transport of sodium and vascular tone. These are involved in maintaining normal blood pressure.

Clinical Manifestations (Forgorus *et al*., 2019; Ali SY *et al*., 2019)

- Recurrent headache
- Dizziness
- Shortness of breath
- Nosebleed
- Blurry vision or other vision disturbances
- Nausea, vomiting, or loss of appetite
- Blood in urine
- Irregular heartbeat

Diagnosis (Suzanne R steinbaug *et al*)

If the initial pressure level (BP) is 140/90mm Hg or more, a second reading should be taken with the third. If the first two readings are significantly different, the lowest reading is then used as the clinic BP. If this clinic BP is 140/90mm Hg or more then home readings should be used to confirm hypertension. Using either ambulatory BP monitor measurements (ABPM) or, if that is not available or is not suitable then home BP measurements (HBPM) using a standard, validated and calibrated machine should be used. A clinic reading of 140/90mm Hg or more, in addition to home readings (ABPM or HBPM) of 135/85mm Hg or more, confirms the diagnosis of hypertension

Treatment (Khatib MN *et al*., 2005).

The primary goals of the hypertensive patient's diagnosis are to attain an optimal decrease in the overall long-term risk of cardiovascular morbidity and death. This needs:

- Effective treatment of all reversible risk factors identified including smoking, dyslipidemia, and diabetes mellitus;
- Effective control of related clinical illness such as congestive heart failure, coronary artery disease, peripheral vascular disease, and transient ischemic attacks;
- Achievement of BP levels of < 130/80 mmHg

Non-Pharmacological Treatment (Sajid M *et al.*, 2018, Kifayat ullah S *et al.*, 2018)

Lifestyle Modifications

To prevent high blood pressure and to deal with individuals with hypertension the implementation of healthy lifestyles is important to all. Modification in diets reduces blood pressure, increases treatment effectiveness against hypertension, and decreases cardiovascular risk. Patients with prehypertension and no comorbidities (including heart failure, previous myocardial infarction or stroke, elevated cardiovascular risk level, diabetes mellitus, chronic renal disease) react well to lifestyle changes.

Dietary Changes (Oza R *et al*., 2018; Garcellano M *et al*., 2015)

It is advised to take a diet with a high intake of vegetables, berries, and whole grains and follow a dash diet.

Physical Activity and Weight Loss

For reducing blood pressure, adults will engage in mild to intensive aerobic physical exercise three or four days a week for an average of 40 minutes per session. Many health effects associate with the moderate-intensity physical exercise of at least 150 minutes a week, such as brisk walking. The health effects of exercise include reduced rates of all-cause death, coronary heart attack, obesity, stroke, type 2 diabetes, metabolic syndrome, cancer of the colon, breast cancer, and depression. One way to inspire patients to participate is to write medications for exercise, particularly for the things they love. Another significant lifestyle change to reduce blood pressure is weight loss. A weight loss of around 10 kg (22 lb) can decrease systolic blood pressure by 5 to 20 mm Hg.

Cessation of Alcohol Consumption (Khatib MN *et al*., 2005*)*

The relation between alcohol consumption, blood pressure rates, and hypertension incidence in communities is a continuous one. High levels of alcohol consumption, particularly binge drinking, are related to a high risk of stroke. In addition, alcohol decreases the effects of drug treatment for antihypertension. Upon sudden alcohol withdrawal, heavy drinkers can also feel increased blood pressure. It should be advised to stop treating hypertensive patients with caffeine.

Cessation of Smoking

It is perhaps the single most important factor of lifestyle to avoid non-cardiovascular and cardiovascular diseases, including stroke. Smoking can also interact with the beneficial effects of other antihypertensive agents. If required they may use nicotine replacement or

buspirone therapies should be considered. Since they appear safe in hypertension and promote cessation of smoking.

Pharmacological Treatment

Diuretics

- Diuretics cause diuresis to lower BP. Reducing the amount of plasma and the number of strokes associated with diuresis reduces both cardiac production and BP. The initial decrease in cardiac output triggers the peripheral vascular resistance to a compensatory rise
- With continuous therapy, the amount of extracellular fluid and plasma rise to close rates of pre-treatment, and the peripheral vascular resistance drop below baseline.
- The diuretic thiazide is indeed the preferred type of diuretic in many patients with hypertension. *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*

Central Agonists

- Clonidine, guanabenz, guanfacine, and methyldopa decrease blood pressure mainly by stimulating α2-Adrenergic receptors in the brain. This in return decreases sympathetic outflow from the center of the vasomotor which increases vagal tone. Presynapticα2-receptor stimulation can peripherally lead to a reduced sympathetic tone.
- Chronic usage results in the retention of sodium and fluid. Other side effects include depression, hypotension to the orthostatic, dizziness, and anticholinergic effects *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

Peripheral Adrenergic Inhibitors

- Reserpine decreases norepinephrine from sympathetic nerve endings and blocks the conveyance of norepinephrine into granules for storage. When the nerve is activated the synapse releases less than the normal amount of norepinephrine. This increases the tone of sympathy, reducing peripheral vascular resistance and BP.
- Reserpine has a long half-life that allows it to be administered once a day. It can also be taken 2 to 6 weeks before the full antihypertensive benefit.
- Reserpine can cause substantial retention of sodium and fluid and should be treated with a diuretic (preferably a thiazide) *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

α1-Receptor Blockers

- Prazosin, terazosin, and doxazosin are selective blockers of α1 receptors that inhibit catecholamine absorption in peripheral vasculature smooth muscle cells, resulting in vasodilatation.
- Sodium and water retention can occur; when given with a diuretic these agents are most effective in preserving antihypertensive efficacy and reducing edema.
- Since doxazosin (and potentially otherα1-receptor blockers) will not be as effective against CV events as other treatments, they should be reserved for special conditions such as people with benign prostatic hyperplasia as an additional agent. For this case, if used to reduce BP, they can only be used in conjunction with the first-line antihypertensives *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

Adrenergic Blockers

- For many years, β-adrenergic blockers were the second most preferred antihypertensive drugs after diuretics
- These are moderate antihypertensive; do not substantially lower BP in normotensives. Used alone, this is appropriate in 30-40 percent of patients-mostly stage I cases. Further BP lowering can be accomplished when paired with other drugs.
- Beta-blockers decrease the cardiac output markedly by 15%-20% and this remains lowered chronically. On the other hand, the peripheral resistance usually rises slightly but falls toward (if not to) normal with time. Renin level falls promptly due to a reduction in the processing of prorenin and active renin *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

Combined α - and β - Adrenergic Receptor Blockers

- Modification of the traditional β-blocker structure provides agents with combined α- and β-blocking properties. The α-to-β-blockade ratio for carvedilol is 1:4. This also inhibits calcium intake at high concentrations.
- For labetalol, the ratio of labetalol to β-blockade is 1:10. The effect of these agents is a due decrease in peripheral vascular resistance. Carvedilol has been shown to reduce the risk of death and hospitalization due to cardiovascular causes.
- Labetalol can be used orally and intravenously for the treatment of hypertensive emergencies, acute aortic dissection, pheochromocytoma, clonidine withdrawal, and

cocaine-related hypertensive crises *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

Calcium Channel Blockers

- Calcium channel blockers (CCBs) cause heart and smooth muscle relaxation by blockage of voltage-sensitive calcium channels. Limited entrance of extracellular calcium into the cells results in vasodilation and a subsequent decrease in BP. Antagonists of the calcium channel dihydropyridine may induce sympathetic reflex activation.
- Verapamil reduces heart rate, delays nodal conduction of atrioventricular (AV). It causes harmful inotropic effects that may precipitate HF in patients with borderline cardiac reserve *(Labert, L et al., dipiro (book), Micheal Possey et al., dipiro (book))*.

Direct Vasodilators

- Such drugs penetrate vascular smooth muscle cells which produce direct vasodilation by means of other pathways, such as inhibiting hormonal vasoconstriction, calcium intake, or blocking adrenergic receptors. Minoxidil causes smooth muscle relaxation by opening cardiovascular potassium ATP-sensitive channels.
- Coincidental to peripheral vasodilatation, heart rate, stroke volume, and cardiac production increase as a result of the baroreceptor-mediated reflex increase in sympathetic discharge. This also enhances the production of renin. Such a countervailing response greatly reduces the use of these medications. These are used as third-party agents in the multidrug treatment of extreme hypertension, usually in conjunction with β-blockers and diuretics. Minoxidil is more potent than hydralazine and has become the mainstay in the treatment of severe hypertension associated with renal insufficiency.

Angiotensin-Converting Enzyme Inhibitors

- Angiotensin II is a very potent chemical released by our body. It is circulated mainly in the blood. This causes the muscles that surround the blood vessels to contract and thereby narrows the arteries. Vessel narrowing raises the pressure within the vessels, causing blood pressure (hypertension) to rise.
- Angiotensin II is produced by the enzyme angiotensin-converting enzyme (ACE) out of angiotensin I in the blood. (In the blood, angiotensin I itself is composed of angiotensinogen, a protein developed by the liver and released into the blood.) Angiotensin-converting enzyme inhibitors (ACE inhibitors) are medicines that slow

down (inhibit) the activity of the ACE enzyme, which reduces angiotensin II development. As a result, blood vessels expand or dilate, and blood pressure decreases (Ogbru O *et al.,2019).*

Angiotensin Receptor Blockers

- Angiotensin II receptor blockers (ARBs) have the same effects as ACE inhibitors, another form of blood pressure drug, but they function through a different mechanism. These medications block the angiotensin II effect, a chemical that narrows the blood vessels. By doing so, they help expand the blood vessels and make it easier for the blood and circulate, which lowers blood pressure. People who cannot tolerate ACE inhibitors are usually given ARBs.

Aims and Objective

- To observe the role of a pharmacist in the management of hypertension.
- To assess the anthropometric details associated with increased risk of hypertension.
- To know the effect of food and daily habits on hypertension.
- To study medication adherence in hypertensive patients.
- To observe changes in the treatment strategy according to age and co-morbidity.

Materials and Methods

Study Design

- The study is a prospective, observational study.

Source of Data and Materials

- Patient Consent Form.
- Patient Data Collection Form.
- Patient Questionnaire.
- Patient Educational Leaflet.

Inclusion Criteria

- Patients who are willing to give consent.
- Patients who are using at least one anti-hypertensive agent are included.

Exclusion Criteria

- Exclude the patients below 18 years.
- Pregnant and lactating are women excluded from the study.
- Patients with Hypertensive crises are not included.

Method of Data Collection

- Case Sheet.
- Patient Questionnaire / Interview.

Study Procedure

This is a prospective observational study in which eligible patients are included after obtaining their consent. A questionnaire and a data collection form are used. This form primarily comprises the patient's demographic information as well as a medication chart. In addition, a booklet is developed and distributed to the patient to inform them of the disease's outcomes. The research was carried out at the MEDICOVER hospital in Hyderabad, India. From the moment of admission to the time of release, all data relevant to the study will be collected, and the data will be analyzed using a suitable statistical method.

Result

Table 1: Distribution of the study population on the basis of gender

Gender	No. of Patients
Male	172 (57%)
Female	128 (43%)

Table 2: Distribution of the study population on the basis of age

Age	No. of Patients
21 - 30	6 (2%)
31 - 40	18 (6%)
41 - 50	58 (20%)
51 - 60	106 (35%)
61 - 70	76 (25%)
71 - 80	32 (11%)
81 - 90	4 (1%)

Table 3.1: Distribution of cases based on the socio-economic data

Socio-Economic Data	No. of Patients
Upper Class	70 (23%)
Middle Class	80 (27%)
Lower Class	150 (50%)

Table 3.2: Distribution of cases based on personal habits of the patient

Personal Habits	No. of Patients
Only Smoking	98 (33%)
Only Alcohol	44 (15%)
Smoking and Alcohol	62 (20%)
No habits	96 (32%)

Table 4: Cases distribution based on the marital status of the patient

Marital Status	No. of Patients
Married	256 (85%)
Unmarried	44 (15%)

Table 5: Distribution of cases based on the level of education of the patient

Level of Education	No. of Patients
Primary Education	192 (65%)
Secondary Education	48 (15%)
Graduate	60 (20%)

Table 6: Disposition of the cases related to the residential area of the patients

Area of Residency	No. of Patients
Urban Region	180 (60%)
Rural Region	120 (40%)

Table 7: Distribution of cases based on their occupation

Occupation	No. of Patients
Unemployed	140 (48%)
Employed	80 (26%)
Self Employed	80 (26%)

Table 8: The prevalence of nephrolithiasis pertaining to the body mass index (BMI) of the patient

Body Mass Index (BMI)	No. of Patients
Underweight	76 (25%)
Normal Weight	22 (7%)
Overweight	88 (30%)
Obese	114 (38%)

Table 9: The prevalence of hypertension according to the pre-existing comorbidities

Pre-Existing Comorbidities	No. of Patients
LV dysfunctttion	4 (1%)
Diabetes Mellitus	30 (10%)
CKD	40 (13%)
Thyroid Disorders	14 (5%)
CAD	140 (47%)

Table 10: Case disposition related to the family history of the patients with Hypertension

Family History	No. of Patients
Father	154 (51%)
Mother	86 (29%)
Grand Parent	40 (14%)
Siblings	20 (6%)

Table 11: Blood pressure monitoring

Monitoring	No. of Patients
Once a week	116 (39%)
Once every 3 months	84 (28%)
Once in every 6 months	56 (19%)
Once a year	42 (14%)

Table 12: Categorization of blood pressure according to JNC-7

Systolic	No. of Patients
Pre-hypertensive(120-139mm/Hg) / (80-80mm/Hg)	189 (63%)
Stage 1 (140-150mm/hg) / (90-99mm/Hg)	87 (29%)
Stage 2 (>160mm/hg) / (>100mm/hg)	24 (8%)

Table 12.1: Analysis of data on basis of pre-existing comorbidity (CAD)

Drugs	No. of Patients
ARB's	62(42%)
Beta Blocker	34 (24%)
Diuretic	20 (14%)
Calcium Channel Blockers	16 (12%)
Ace Inhibitors	6 (5%)

Table 12.2: Analysis of data on basis of pre-existing comorbidity (CKD)

Drugs	No. of Patients
Diuretic	24 (65%)
Calcium Channel Blockers	8 (18%)
ARB's	8 (17%)

Table 12.3: Analysis of data on basis of pre-existing comorbidity (Diabetes Mellitus)

Drug	No. of Patients
ARB's	26 (82%)
Beta Blocker	2 (6%)
Calcium Channel Blocker	2 (6%)
ACE Inhibitors	2 (6%)

Table 12.4: Use of ARB's, Beta Blockers and CCB's according to Age

Drug	21-30	31-40	41-50	51-60	61-70	71-80	81-90
ARB's	2	8	16	38	28	14	2
Beta Blocker	0	0	16	12	12	2	2
Calcium Channel Blocker	0	0	4	10	10	2	0

Table 12.5: Drug Therapy

Drug therapy	No. of Patients
Mono Therapy	276 (92%)
Combination Therapy	24 (8%)

Table 12.6: The most common drugs prescribed as Mono Therapy

Drug	No. of Patients
ARB's	78 (44%)
Beta Blockers	78 (26%)
Diuretic	40 (13%)
Calcium Channel Blockers	40(13%)
Ace Inhibitors	14 (4%)

Table 13.1: Distribution of cases based on the dietary habits of the patient

Intake of Patients	No. of Patients
Veg	84 (28%)
Non-veg	216 (72%)

Table 13.2: Distribution of cases based on the foods taken by the patient

Foods	No. of Patients
High Salt Intake	1240 (27%)
Milk	108 (24%)
Processed Foods	100 (22%)
High Sugar	40 (9%)
Protein	24 (9%)
Coffee	20 (5%)
Ready to make Food	40 (4%)

Discussion

- A total of 300 prescriptions were assessed out of which 47% were female and 53% male. These findings were in line with prevalence data by Saumya Ramdas. Studies by Khurshid *et al*, Bajaj *et al*, and Solanki *et al*, in northern and western parts of India, showed a higher prevalence among females than in males. All these studies point out the fact that the prevalence of hypertension varies from continent to continent and also within India from region to region.
- Hypertension is especially troubling the elderly population. The prevalence of hypertension increases with it also as age increases. In the present study age group of 50-60 and above was nearly twice as likely to be hypertensive compared to the age group of 21-30 years which goes hand in hand with finding by Saumya *et al*, M. B Sujatha *et al*, M. A Andrews *et al*.
- The present study indicated that BMI was independently associated with hypertension; respondents who were overweight/obese were 4.29 times more likely to be hypertensive than their normal counterparts. This finding was consistent with previous population-based studies reports. In the present study, 20% were literate,

48% were employed, 33% were smokers and 15% were alcoholics. Having a family history of hypertension in this study was strongly related to being hypertensive. This result is comparable to studies carried out in Sri Lanka. This may be because family members will share common genetic and lifestyle influences.

- The results of this study revealed that low fruit intake was associated with hypertension; respondents that did not consume adequate fruit were 2.45 times more likely than their counterparts to be hypertensive. That finding is consistent with earlier studies. This may be explained in part by fruit consumption, which decreases the likelihood of hypertension by lowering weight, as demonstrated by seeing a study conducted elsewhere
- In our study out of a total of 300 cases, the majority of the patients i.e, 63% (189) were among prehypertensive stage, 29% (87) patients were among stage-1 and 8% (24) were in stage-2. 8. Among the patients with CAD, ARBs were mostly prescribed. In CKD patients diuretics followed by ccbs were preferred. Most of the guidelines recommend using ARBs in the treatment of hypertension associated with CKD. In diabetic patients, ARBs followed by beta-blockers were commonly used. ARBs have desirable effects on urinary protein excretion and are hence recommended in the management of hypertension associated with diabetes. This study is supported by Johnson *et al*.
- Most of the hypertensive subjects were on monotherapy, with less than 10% multidrug therapy. A highly recommended class of drugs according to our study is ARB. In ARB, telmisartan was found to be the most commonly prescribed drug with 87% (110). This study is supported by the study conducted by Trefor Morgan *et al*. In our study, utilization of antihypertensive drug classes used in monotherapy are in decreasing order was ARBs (44%), followed by BBs (26%), diuretics (13%), CCBs (13%), and ACEI (5%). Higher utilization of ARBs might be because of physicians' perceptions that ARBs have better control of blood pressure and fewer adverse effects compared to diuretics in addition to conferring cardiovascular and renal protection. The decreasing use of diuretics or BBs, which is also reflected in our study may be explained by physician misperceptions that diuretics are less effective, less safe and BBs are less well tolerated than other medications for the management of hypertension. Among those on monotherapy, the proportion of patients with good control was highest. Good control of BP is usually achieved more easily in patients

with mild hypertension with a single drug than in patients with moderate to severe hypertension, who often require multidrug therapy. In comparison, the single-treatment pill burden is much less of a challenge compared to multi-drug treatment, promoting greater enforcement and management of BP for individuals with moderate hypertension on single therapy.

- Out of 22 patients which were on multidrug therapy, 26.5% (6) were on ARB+CCB. Other 26.5% (6) were on diuretic + CCB. 18% (4) on ARB+diuretic.18% (4) were on beta blocker + CCB and the least used combination was 11% with ARB + CCB + diuretic.
- In our study Out of 300 patients, 65% (195) patients were medically non-adherent and 35 % were medication adherence. Many factors affect the medication adherence of hypertensive patients. In the literature, there are different results regarding the relationship between medication adherence and age. Our study is similar to the study "Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: a multicentre study". One of the limitations of this study was we could not perform pill counts of the antihypertensive medication, since none of the patients brought their pills. Therefore, we recorded the days without drugs. Patients do not take their medication mainly due to forgetfulness, feeling well, being too busy, and poverty.

Conclusion

A prospective observational study was carried out for over a period of 6 months on 300 patients admitted to the Medicover Hospital, Hyderabad, India to determine the epidemiological risk factors associated with this disease.

Males were at more risk than females due to cigarette smoking, alcohol consumption, and high salt intake on daily basis. The age group that was affected the most was 51 - 60 years in both males and females. Among the various demographic details that were taken into consideration are age, gender, BMI, smoking, alcoholism, pre-existing co-morbidity, food intake patterns that were affected. In general, single-drug therapy was more prescribed when compared to combination therapy, respectively. ARB' were the most commonly prescribed class of drugs. On the other hand, their combination with CCB was the most preferred. Coronary artery disease is more likely to be seen in hypertensive patients than any other co-morbidity.

Provider pharmacologic choices and lifestyle modification recommendations including exercise are major components to blood pressure control in this population. In the early stages of hypertension, lifestyle modifications can be used as primary treatment before the start of drug therapy and can act as adjuvant to drug therapy in persons already on medication. Dietary modifications are a mainstay for the prevention and initial treatment of hypertension. Regular moderate physical activity is recommended for BP management.

Acknowledgment

The authors are thankful to Dr. Aliya Parveen (Assistant Prof, Nizam Institute of Pharmacy), for constant support in accomplishing this project.

References

Hypertension. World health organization.2020. Ghoush S, K Sarat Chandra, Junapudi Syam Sundar. High prevalence of hypertension in Telangana. 2020 January 16.

Pharmacotherapy A Pathophysiologic Approach by Joseph T Dipiro, Robert L Labert, L. Micheal Possey Dipirio (book)

Khatib MN, El-Guindy M. Clinical guidelines for the management of hypertension. World Health Organization. 2005.

Suzanne R steinbaug. Diagnosing high blood pressure. Web MD. June 06, 2019.

Singh S, Shankar R, Singh GP. Prevalence and Associated Risk Factors of Hypertension. Int. Journal of Hypertension. 2017 Dec 3.

Beevers g, Lip YH, O'Brien E. The pathophysiology of hypertension. BMJ. 2001 Apr 14; 322 (7291): 912–916.

Forgorus,NR, Ali SY. How Hypertension Is Diagnosed. Very well health. 2019. December.

Suzanne R steinbaug Causes of high blood pressure. Web MD. August 25 2019.

Forgorus, NR, Ali SY. Symptoms of Hypertension. Very well health. 2019, December 9.

High blood pressure. Mayo clinic.2020.

Sajid M, kifayat ullah S, Khan T, Nawaz S, Rashid H, Syed W, Kamran S. Non-Pharmacological management of hypertension. National library of medicine. 2018 August 22.

Alexander RM,Yang YH. Hypertension Treatment and Management. Medscape. 2019 feb 22.

Oza R, Garcellano M. Nonpharmacologic Management of Hypertension. American family physician. 2015 June 1 ;91(11):772-776. Available from: Tripathi KD. Essentials of Medical Pharmacology. 7th ed. India: Jaypee; 2013. Kd Tripathi (book)

Ogbru O. ACE Inhibitors Drug Class Side Effects, List of Names, Uses, and Dosage. Medicinenet. 2019.

Haggstrom M. Main complications of persistent high blood pressure.2009 May 26.

Varakhantham V, Kumar A, Kuarakula S. antihypertensive prescription pattern and compliance to JNC7 and JNC8 at tertiary care government hospital Hyderabad. Sage J. 2017 November 01.

Sivasakthi R, Solomon S, Nithiyan K. Assessment of Prescribing Pattern for Hypertension and Comparison with JNC-8 Guidelines-Proposed Intervention by Clinical Pharmacist. Journal of Young Pharmacists. Vol 8, Issue 2, Apr-Jun, 2016

Tsioufis, Konstantinos; Kreutz, Reinhold, Sykara, Georgia, van Vugt, Joris, Hassan, Tarek. Impact of single-pill combination therapy on adherence, blood pressure control, and clinical outcomes. journal of hypertension. 2020 June. Volume 38.

Arshad H, Uday v, konuru V. A study on prescribing patterns of antihypertensives in geriatric patients. PMC. 2012 Oct-Dec; 3(4): 139–142.

Amruth Raj V, Ashesh Gautam, Sumit Ghimire, Shashidhar G, Mahesh N M and Sunil Gyawali. Prescribing pattern of antihypertensive drugs and cost analysis in tertiary care and teaching hospital. World of the J. and Pharmaceutical Sciences. 2015 January.

K vashista. Study on drug utilization pattern of antihypertensive medication in tertiary care hospital of Telangana, India. IJBCP. Volume 7 number 9.2018.

Prashant ch, Kumar Sathish, Akhila m. Prescribing Pattern and Pharmacoeconomic Evaluation of Antihypertensive Drugs at a Tertiary Care Hospital. PULSUS. 2020.

Katta Venkatesh Ramanath, Katti Ravi Venkappa. Study the impact of clinical pharmacist-provided patient counseling on hypertension management in rural Indian population. APP. Vol. 4 y Issue 1 y Jan-Mar 2013.

Kumar S, Roopa P, R Rahavi. A cross-sectional retrospective study to assess the pattern of prescribing for inpatient hypertensive cases in a tertiary hospital and to find out the possible avenues for the betterment of hypertension management. AMHS.2015.

Grillo A, Salva L, coruzzi P. Sodium Intake and Hypertension. 2019 September 11.

Varakantham v, Kumar A, Kumar D. Antihypertensive Prescription Pattern and Compliance to JNC 7 and JNC 8 at Tertiary Care Government Hospital, Hyderabad, India: A Cross-sectional Retrospective Study. pubmed. 2018, April 53 (2):107-112.

D. Guru Prasanna, d. Giri Rajasekhar, p. Chandrakanth. Prescribing pattern of antihypertensive drugs based on compelling indications with hypertension. IJPPS. vol 8, issue 2, 2016.

Kuchake VG, Maheshwari Od, Surana SJ, Patil PH, Dighore PN. Prescription Pattern of Antihypertensive Drugs in Uncomplicated Hypertensive Patients at Teaching Hospital. APTI. 2009; 2(2):74-80.

Rachana PR, Anuradha HV, MC Shivamurthy. Anti-Hypertensive Prescribing Patterns and Cost Analysis for Primary Hypertension: A Retrospective Study. JCDR. 2014 Sep; 8(9): HC19–HC22.

Tadesse ma, Yonas GT, Tamrat BA. Antihypertensive drug prescription patterns and their impact on the outcome of blood pressure in Ethiopia: a hospital-based cross-sectional study. Pubmed.2017 Jan 29; 6-29-35.

D pattrow, W kirch, B Bramlage. Patterns of Antihypertensive Drug Utilization in Primary Care. Pubmed. 2004 march 04.

BL Carter, WJ Elliot. The Role of Pharmacists in the Detection, Management, and Control of Hypertension: A National Call to Action. Pubmed .2000 Feb 02;119-22.

Ashok K. Sharma, Navdeep Dahiya, Jayant K. Kairi, Sandesh M. Bharati. Prescription patterns of antihypertensive drugs in a tertiary care hospital in India. IJBCP.2015 Nov; vol 5.

Saumya Ramadas, M. B. Sujatha, M. A. Andrews, Sanalkumar K. B. Drug utilization study of antihypertensive drugs and prevalence of blood pressure control in adult hypertensive patients based on JNC VIII guidelines in a tertiary care hospital: a cross-sectional study. IJBCP. 2019.

Sheila M hedge, Scott D. Influence of Physical Activity on Hypertension and Cardiac Structure and Function. NCBI. 2016 Oct 1.

Priyanka R, dilini N, Ranil J. influence of the family history of hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults. BMC.2015 June 15.

Landi F, Clavani F, Tosati M. Body mass index is strongly associated with hypertension. NCBI. 2018 December 13.

James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, *et al*. Evidence-based guideline for the management of high blood pressure in adults. JAMA. 2013;1097(5):1-14.

Johnson ML, Singh H. Patterns of antihypertensive therapy among patients with diabetes. J. Gen Intern Med. 2005; 20(9): 842-6

Trefon morgan. Monotherapy is used in the treatment of hypertension. 1983 February

Ubel PA, Jepson C, Asch DA. Misperceptions about beta-Blockers and diuretics: a national survey of primary care Physicians. J. Gen. Inter. Med. 2003;18(12): 977-83.

Hypertension Study Group V. Prevalence, awareness, treatment, and control of hypertension among the elderly in Bangladesh and India: a multicentre study. Bull WHO. 2001; 7