



RESEARCH ARTICLE

A CROSS-SECTIONAL RETROSPECTIVE STUDY TO ASSESS THE PRESCRIBING PATTERN OF ANTIHYPERTENSIVE DRUG THERAPY IN A TERTIARY CARE TEACHING HOSPITAL, IMPHAL, MANIPUR

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ABSTRACT

Objective: The objective of this study was to analyze the Prescribing practice of antihypertensive medications in a tertiary care hospital in North East India and to assess the appropriateness of the prescribing pattern of antihypertensive drugs as per the seventh report of the Joint National Committee (JNC-7) guidelines.

Methodology: A cross-sectional retrospective study was carried out for the month of October 2016-March 2017. Inpatient hypertensive cases suffering from hypertension with or without co-morbidities were included and were analyzed on the basis of age, percentage of male and female patients, anti-hypertensive drug category, most frequently prescribed hypertensive drug and percentage of one or two drug combination.

Results: A total of 200 hypertensive patients on treatment, of which 37% were females and 62.8% males, were included. The most common co-morbid condition was Diabetes Mellitus. The most common drugs involved in the study were calcium channel blockers 47% followed by angiotensin II receptor blockers 22%. The commonest two drug therapy was with BB and CCB (32.9%), followed by ARB and CCB (21.1%), CCB and Diuretics (16.4%), ACEI and diuretic (11.7%)

Conclusions: The most favored class of antihypertensive drugs, in hypertensive patients with or without comorbidities was CCBs. There was underutilization of thiazide diuretics, ACEIs and BBs in this study. Overall the general pattern of antihypertensive prescribing in this study is only partly in accordance with the guidelines of JNC-7.

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INTRODUCTION

Hypertension is one of the most important preventable causes of cardiovascular disease mortality worldwide (Ezzati et al., 2002). According to the World Health Organization (WHO) estimate, at least a billion people in the world are living with hypertension and about 7.1 million mortality annually (World Health Report, 2002). The prevalence of hypertension is increasing and is predicted to grow by more than 500 million by 2025 (Kearney et al., 2005; Fuentes et al., 2000). Evidence from large clinical trials now suggests that lowering blood pressure effectively prevents these adverse outcomes (Neal et al., 2000; Staessen, 2001). Even with treatment, control of blood pressure can be difficult, with only one-third of treated hypertensive's having a systolic blood pressure (SBP) that is less than 140 mm Hg (Rosamond, 2008; Chobanian et al., 2003).

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Despite these facts and the widespread availability of effective antihypertensive medications, the vast majority of >1 billion hypertensive patients worldwide remain with Uncontrolled BP (Wolf-Maier et al., 2004). To achieve the goal of normal blood pressure (BP), practice guidelines serve as useful tools for clinical decision making (Chobanian et al., 2003; Wagner, 1998; Bodenheimer et al., 2002) The most notable evidence based practice guideline for the management of hypertension is the Seventh Report of the Joint National Committee (JNC-7) on the Detection, Evaluation and Treatment of High BP. JNC-7 provides guidelines and advisories delineated to improve treatment and control of hypertension (Chobanian et al., 2003; U.S. Department of Health and Human Services, 2004). The Hypertension Society of India, and the Indian College of Physicians closely follow the JNC guidelines (Datta et al., 2011). In spite of the presence of practice guidelines and effective drugs, hypertension management in the society is far from satisfactory. Reported studies have shown that only 50% of physicians prescribe in accordance with guideline recommendations (Ramli et al., 2010; Holmes et al., 2004).

Efforts to effectively improve the extent of control of hypertension should ideally be based on a thorough understanding of the characteristics of patients, the dynamics of the health care system and, most importantly, on the work and function of the primary care physician as the gatekeeper (Hyman, 2001). Therefore, the role of physicians' attitudes and practice patterns (recognition, treatment, and management) has received increased attention as a contributor to poor control of hypertension (Hyman, 2000; Berlowitz *et al.*, 1998). Nevertheless, population-based surveys of hypertension management throughout the world consistently show variably inadequate control of blood pressure (Joff *et al.*, 2013; Volpe, 2007). In India, hypertension is the leading non-communicable disease (NCD) risk and estimated to be attributable for nearly 10 per cent of all deaths (Patel *et al.*, 2011). The number of hypertensive individuals is anticipated to nearly double from 118 million in 2000 to 213 million by 2025 (Mohan, 2013).

MATERIALS AND METHODS

A cross sectional retrospective study was carried out at RIMS Hospital, Regional Institute of Medical Sciences, Imphal, Manipur from October 2016 to March 2017. The case files of 200 patients were retrieved from Medical Record Department after obtaining approval from Research Ethics Board (No. A/206/REB/Prop(SP)25/1/2017). Then, the relevant information from the case record was entered in the preformed performa. The brand names of drugs in prescriptions were decoded to generic names of drugs. Drug selection indicators

selected for present study includes age, percentage of Both patients (Male and Female), anti-hypertensive drug category, name of prescribed drug, most frequently prescribed antihypertensive drug, percentage of one/two drug combination. The name of the patient was not included in the recording format to maintain the confidentiality. The hypertension was classified in the study based on JNC-7 guidelines. The prescribing pattern of antihypertensive drugs in the studied population was noted and whether patients were on monotherapy or polytherapy was also observed. Patients above 18 years of age and suffering from essential hypertension and on at least one antihypertensive drug with or without other comorbid conditions were included in the study. All the outpatient department cases were excluded and only inpatient cases of Department of General Medicine regardless of the span of hospitalization were included in the study.

RESULTS

A total of 200 hypertensive patients on treatment were included, of which 37.1% were females and 62.8% males. Mean age was 62.1 years. Table 1 shows demographic details. The patients were classified according to the JNC-7 classification criteria for hypertension. Most commonly prescribed drug classes involved in the study was Calcium Channel Blockers 47% followed by Angiotensin II receptor antagonists 18%, Beta blockers 15%, ACE Inhibitors 8% etc. The leading drugs were Amlodipine, Losartan, Telmisartan, Metoprolol, Enalapril and Hydrochlorothiazide. The most

Table 1. Demographic details of the patients

Demographic details	n (%)
Sex	
Female	74 (37%)
Male	126 (62.8%)
Age	
Mean	62 years

Table 2. Classification of hypertensive patients on the basis of JNC-7

Systolic blood pressure	Number and percentage	Diastolic blood pressure	Number and percentage
Pre- Hypertension (120-139 mmHg)	121	Pre-Hypertension (80-89 mmHg)	111
Stage-I Hypertension (140-159 mmHg)	53	Stage-I Hypertension (90-99 mmHg)	64
Stage-II Hypertension (\geq 160 mmHg)	26	Stage-II Hypertension (\geq 100 mmHg)	25

Table 3. Percentage of prescribed monotherapy antihypertensives

Drug class	Number of prescriptions	Percentage
Calcium channel blockers	45	47%
Angiotensin receptor blockers	21	22%
Beta blockers	15	15%
ACE inhibitors	8	8%
Diuretics	8	8%

Table 4. Percentage of combination drugs used for treatment

Drug combinations	Number of prescriptions	Percentage
Beta blockers + CCB	28	32.9%
ARB + CCB	18	21.1%
CCB + Diuretics	14	16.4%
ACEI + Diuretic	10	11.7%
CCB + ACEI	10	11.7%
BB + Diuretics	5	5.8%

Table 5. Frequencies of other co-morbid conditions

Other co-morbid conditions	Frequencies
Hypertension + DM	69%
Hypertension + IHD	55%
Hypertension + Nephropathy	31%
Hypertension + Cerebrovascular disease	27%

common anti-hypertensive combination therapy involved in the study was Calcium channel blockers + Beta blockers followed by Beta blocker + Angiotensin receptor blockers followed by ARB + CCB followed by ARB + Diuretic. Hypertension alone was present in 9% of the patient whereas diabetes mellitus was the most common comorbid condition in 69% of the cases. Other comorbid conditions were ischemic heart disease (IHD) 55%, Nephropathy (31%), and cerebrovascular disease (27%). Many patients were also suffering from more than one comorbid condition at the same time.

DISCUSSION

Hypertension is one of the major risk factors for cardiovascular and cerebrovascular diseases. Its prevalence is increasing due to increasing longevity, obesity, changes in diet and sedentary lifestyle coupled with stress. Evidences from randomised controlled trials (RCTs) has shown benefit of antihypertensive drug treatment in reducing important health outcomes in persons with hypertension (Staessen, 2001; No authors listed, 1991). Several hundreds of thousands of major cardiovascular events might possibly have been prevented as a result of improvements in practice (Falaschetti *et al.*, 2011). For the pharmacological management of hypertension, treatment thresholds and targets should be predicated on the patient's global atherosclerotic risk, target organ damage and co-morbid conditions. Blood pressure should be decreased to less than 140/90 mmHg in all patients, and to less than 130/80 mmHg in patients with diabetes mellitus or chronic kidney disease (Chaitanya, 2006). Most patients will require more than one agent to achieve these target blood pressures. Antihypertensive therapy should be considered in all adult patients regardless of age. For adults without compelling indications for other agents, considerations for initial therapy should include thiazide diuretics, Angiotensin-Converting Enzyme (ACE) inhibitors, calcium channel blockers (CCBs), angiotensin receptor blockers (ARBs) or beta-blockers (Hackam *et al.*, 2010). In this cross-sectional retrospective study done on inpatients of the department of medicine in a tertiary care teaching hospital, there was a higher prevalence of hypertension in elderly patients. The maximum number of patients was found to be in the age group of 55–64 years followed by age group of ≥ 65 years. In fact, it is well established fact that increase in BP happens gradually with the increasing age, and that majority of the elderly can be denoted as hypertensive with stage 2 hypertension (Ezzati *et al.*, 2002; Virdis *et al.*, 2011).

Calcium channel blockers were more commonly prescribed drugs both as a single drug therapy and in overall utilization. Same findings were seen in the study conducted by Gupta SK *et al.* (2015) in Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar. Among the calcium channel blockers the most commonly prescribed drugs were the dihydropyridine type of calcium channel blockers (i.e., amlodipine, felodipine) whereas the prescription of non-dihydropyridine type of calcium channel blockers was very less. Amlodipine was the most commonly prescribed individual drug. The large proportion of prescription of CCB's may be because of the type of patients referred to this tertiary care center with complications related to the cardiovascular, renal and other systems or refractory hypertension (Denis *et al.*, 2001). Moreover, because in this study majority of the subjects were above 50 years of age, the extensive use of CCB was noted because drug of choice for the elderly patient is CCB or

diuretic (Steffen *et al.*, 2004; Grossman *et al.*, 2011). Prescribing is a complex behaviour simultaneously affected by several factors of varying intensity; the regulations set in different guidelines constitute only one of these. Among other things, both patients' and doctors' expectations, perceptions and experiences may affect prescribing, as do the marketing efforts of the pharmaceutical industry.

It was noted that though the use of diuretics was present but in less proportion. Seventh Report of the Joint National Committee guidelines recommend that thiazide diuretics should be prescribed as initial treatment for most patients with uncomplicated hypertension either alone or in combination with drugs from other classes (Chobanian *et al.*, 2003; U.S. Department of Health and Human Services, 2004; Singh, 2005). In spite of these recommendations, diuretics particularly thiazide diuretics were found to be prescribed less often to patients as single drug treatment in our study. The restricted prescribing of diuretics by doctors has been earlier reported due to the misconception about the safety and efficacy of diuretics (Singh *et al.*, 2005; Rochefort, 2012; Maghrabi, 2013) For instance, Rochefort *et al.* (2013) reported a limited use of diuretics in health centers in the Canadian province of Quebec due to misperceptions about the efficacy, safety, and tolerability of these drugs among physicians. In our study, majority of the patients were on combination therapy and diuretic was part of most of the combination regimen. This finding is as per the JNC-7 guideline which also asserts that most patients require two or more drugs to achieve BP control and diuretics should form a part of the combination if two drugs are being used to treat hypertension (Chobanian, 2003; U.S. Department of Health and Human Services, 2004). As diuretics are known to complement the antihypertensive efficacy of multi-drug regimen, they can be valuable in accomplishing BP control and moreover they are cheaper than other AHAs. Moreover, the JNC-7 guideline reports that volume overload due to inadequate diuretic therapy is one of the commonest reason for resistance to hypertension treatments (Chobanian *et al.*, 2003; U.S. Department of Health and Human Services, 2004; Singh, 2005).

Conclusion

It was noted that the most favoured class of antihypertensive drugs, either as monotherapy or combination therapy in hypertensive patients with or without co-morbidities was CCBs. There was underutilisation of thiazide diuretics, ACEIs and BBs in this study, in spite of reasonable evidences backing their prescription. Overall, the general pattern of antihypertensive prescribing in this study is only partly in accordance with the guidelines of JNC-7. These findings reemphasise the fact that prescribing is a composite practice which is concurrently influenced by various factors and different practicing guidelines is only one of those factors. Few other factors influencing prescribing might be viewpoint and understanding of both patients and doctors and cost of the medicine. The marketing influence of the pharmaceutical industry cannot be ruled out. The other factor influencing the therapeutic decisions of doctors regardless of guidelines might be accessibility of a particular drug in the hospital pharmacy (Maghrabi, 2013; Montgomery *et al.*, 2008). Despite enhanced knowledge about hypertension, the healthcare systems across the world have not been able to translate knowledge about hypertension into practice. Hence, it is recommended that regular training should be provided to prescribers on practicing

guidelines and rational use of drugs in hypertension (Anand, 2004).

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REFERENCES

- Anand, M.P. 2004. JNC 7 Guidelines and Indian Scenario. The Association of Physicians of India (API). CME. Chapter 17, p. 139-44.
- Berlowitz, D.R., Ash, A.S., Hickey, E.C. *et al.* 1998. Inadequate management of blood pressure in a hypertensive population. *N Engl J Med.*, 339:1957-1963
- Bodenheimer, T., Wagner, E.H., Grumbach, K. 2002. Improving primary care for patients with chronic illness: The chronic care model, Part 2. *JAMA*;288:1909-14.
- Chaitanya, M.S. Prescribing Pattern of Drugs in Hypertensive Patients-A Retrospective Study.
- Chobanian, A.V., Bakris, G.L., Black, H.R. *et al.* 2003. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension*.42:1206- 1252.
- Datta, S. 2011. Use of antihypertensives in patients having associated renal parenchymal disorders: Cross sectional prescription pattern study in a tertiary care hospital. *Int J Pharm Sci Drug Res.*, 3:256-9.
- Denis, X., Noby, M., Johnson, P., Prem, P. 2001. Pattern of drug use in hypertension in a tertiary hospital: A cross sectional study in the in-patient wards. *Indian J Pharmacol.*, 33:456-7.
- Ezzati, M., Lopez, A.D., Rodgers, A., Vander, H.S., Murray, C.J. 2002. Selected major risk factors and global and regional burden of disease. *Lancet*; 360:1347-1360.
- Falaschetti, E., Mindell, J., Knott, C., Poulter, N. 2014. Hypertension management in England: a serial cross-sectional study from 1994 to 2011. *The Lancet*. Jun 6;383(9932):1912-9.
- Fuentes, R., Ilmaniemi, N., Laurikainen, E. *et al.* 2000. Hypertension in developing economies: a review of population-based studies carried out from 1980 to 1998. *J Hypertens*.18:521-29.
- Grossman, E., Verdecchia, P., Shamiss, A., Angeli, F., Reboldi, G. 2011. Diuretic treatment of hypertension. *Diabetes Care.*, 34 Suppl 2:S313-9.
- Gupta, S.K., Nayak, R.P., Rahavi, R., Kumar, A. 2015. 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 betterment of hypertension management. *Arch Med Health Sci.*, 3:60-5
- Hackam, D.G., Khan, N.A., Hemmelgarn, B.R. *et al.* 2010. The 2010 Canadian hypertension education program recommendations for the management of hypertension: Part 2 – therapy. *Can J Cardiol.*, 26(5):249- 258.
- Holmes, J.S., Shevrin, M., Goldman, B., Share, D. 2004. Translating research into practice: Are physicians following evidencebased guidelines in the treatment of hypertension? *Med Care Res Rev.*, 61:453-73.
- Hyman, D.J., Pavlik, V.N. 2000. Self-reported hypertension treatment practices among primary care physicians: blood pressure thresholds, drug choices, and the role of guidelines and evidence-based medicine. *Arch Intern Med.*, 160:2281-2286
- Hyman, D.J., Pavlik, V.N. 2001. Characteristics of patients with uncontrolled hypertension in the United States. *N Engl J Med* 345:479-486
- Hyman, D.J., Pavlik, V.N., Vallbona, C. 2000. Physician role in lack of awareness and control of hypertension. *J Clin Hypertens*, 2:324-330
- Joffe, M., Falaschetti, E., Gillespie, C. *et al.* 2013. Hypertension prevalence, awareness, treatment and control and associated stroke and ischemic heart disease mortality in England, the USA, and Canada. *BMJ Open.*, 3:e003423.
- Kearney, P.M., Whelton, M., Reynolds, *et al.* 2005. Global burden of hypertension: analysis of worldwide data. *Lancet*. 365:217-23.
- Maghrabi, I.A. 2013. Evaluation of antihypertensive prescribing patterns in the western region of Saudi Arabia and its compliance with national guidelines. *Saudi J Health Sci*, 2:118-26.
- Mohan *et al.* 2013. Time to effectively address hypertension in India. *Indian J Med Res.*, 137:627-631.
- Montgomery, B.D., Mansfield, P.R., Spurling, G.K., Ward, A.M. 2008. Do advertisements for antihypertensive drugs in Australia promote quality prescribing? A cross-sectional study. *BMC Public Health.*, 8:167.
- Neal, B., Mac Mahon, S. *et al.* 2000. Blood pressure lowering treatment trials collaboration. Effects of ACE inhibitors, calcium antagonists, and other bloodpressure lowering drugs: results of prospectively designed overviews of randomized trials. Blood Pressure Lowering Treatment Trialists' Collaboration. *Lancet*. 355:1955-64.
- No authors listed. 1991. SHEP Cooperative Research Group. Prevention of stroke by antihypertensive drug treatment in older persons with isolated systolic hypertension: final results of the Systolic Hypertension in the Elderly Program (SHEP). *JAMA*. 265(24):3255-3264.
- Patel, V., Chatterji, S., Chisholm, D., Ebrahim, S., Gopalakrishna, G., Mathers, C. *et al.* 2011. Chronic diseases and injuries in India. *Lancet*.377:413-28.
- Ramli, A.S., Miskan, M., Ng, K.K., Ambigga, D., Nafiza, M.N., Mazapuspavina, M.Y. *et al.* 2010. Prescribing of antihypertensive agents in public primary care clinics — Is it in accordance with current evidence? *Malays Fam Physician.*, 5:36-40.
- Rochefort, C.M., Morlec, J., Tamblyn, R.M. 2012. What differentiates primary care physicians who predominantly prescribe diuretics for treating mild to moderate hypertension from those who do not? A comparative qualitative study. *BMC Fam Pract*;13:9.
- Rosamond, W., Flegal, K., Furie, K. *et al.* 2008. Heart disease and stroke statistics 2008 update: A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*.117:e25 e146.
- Singh, H., Johnson, M.L. 2005. Prescribing patterns of diuretics in multi-drug antihypertensive regimens. *J Clin Hypertens (Greenwich)*;7:81-7.

- Staessen, J.A., Wang, J.G., Thijs, L. 2001. Cardiovascular protection and blood pressure reduction: A meta-analysis. *Lancet*. 358:1305-15.
- Steffen, H.M. 2004. Use of calcium channel antagonists for the treatment of hypertension in the elderly. *Drugs Aging*., 21:565-81.
- U.S. Department of Health and Human Services. National Institutes of Health. National Heart, Lung, and Blood Institute. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. NIH Publication No. 04-5230, August 2004.
- Viridis, A., Bruno, R.M., Neves, M.F., Bernini, G., Taddei, S., Ghiadoni, L. 2011. Hypertension in the elderly: An evidence-based review. *Curr Pharm Des.*,17:3020-31.
- Volpe, M., Tocci, G., Trimarco, B. *et al.* 2007. Blood pressure control in Italy: results of recent surveys on hypertension. *J Hypertens.*, 25:1491-98.
- Wagner, E.H. 1998. Chronic disease management: What will it take to improve care for chronic illness? *Eff Clin Pract.*, 1:2-4.
- Wolf-Maier, K., Cooper, R.S., Kramer, H., Banegas, J.R. *et al.* 2004. Hypertension treatment and control in five European countries, Canada, and the United States. *Hypertension*. 43:10-17.
- World Health Report, 2002. Reducing risks, promoting health life. Geneva, Switzerland: World Health Organization; 2002.
