PRESCRIPTION PATTERNS OF ANTIHYPERTENSIVE DRUGS AND ADHERENCE TO JNC VII GUIDELINES IN A TERTIARY CARE HOSPITAL IN NORTH INDIA

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Abstract-
Introduction
Hypertension is a chronic illness associated with high morbidity & mortality. A large number of antihypertensive drugs alone or in various combinations are available and physicians need to choose the most appropriate drug for a particular patient. The standard treatment guidelines and drug utilization studies at regular intervals help physicians to prescribe drugs rationally. The present study was conducted to analyze the prescription patterns of antihypertensive drugs and adherence to JNC VII guidelines in a North Indian tertiary care hospital.
Methods
Drug utilization data of 500 hypertensive patients, attending medicine Out Patient Department of Punjab Institute of Medical Sciences Hospital from October 2010 to March 2011 was collected from 24 hour hospital pharmacy. Following groups of anti hypertensive drugs were analyzed; Angiotensin converting enzyme inhibitors (ACE inhibitors), Angiotensin Receptor Blockers (ARBs), Beta Blockers, Calcium Channel Blockers (CCBs), Diuretics, Alpha Adrenergic Blockers and Central Sympatholytics. Patients suffering from essential hypertension with or without other co-morbid conditions were included in the study. Frequency and proportion of prescribing different groups of anti hypertensive drugs as monotherapy or combination therapy and prescription of fixed drug combinations (FDCs) was analyzed.
Results
The most frequently prescribed antihypertensive drugs were diuretics followed by ARBs, Beta Blockers, CCB's and ACE inhibitors. 42.6% received monotherapy and 57.4% received combination therapy. 41.6% patients received fixed drug combinations. The prescription pattern was found to be in accordance with JNC VII guidelines.
Key Words- Antihypertensives, drug utilization, ACE inhibitors, ARBs, Diuretics, JNC VII

Introduction

Hypertension is a public health problem causing 4.5% of global disease burden. Prevalence is estimated to increase further from 26.4% in 2000 to 29.2% in 2025 worldwide [1]. Raised blood pressure is an important risk factor for cardiovascular disease [2]. Hypertension related deaths constitute 1/3rd of global mortality cases [3]. Sufficient scientific evidence exists to suggest that such adverse outcomes can be prevented by lowering blood pressure effectively [4,5]. Therefore, once hypertension is diagnosed, starting rational antihypertensive therapy on long term basis along with regular follow up is immensely important.

A wide range of antihypertensive drugs belonging to different pharmacological classes are available such as Angiotensin Converting Enzyme inhibitors, Beta Blockers, Angiotensin Receptor Blockers, Calcium Channel Blockers, Diuretics, Alpha adrenergic blockers and central sympatholytics. Choice of drugs for a particular patient changes at short intervals because of factors like efficacy, side effects, cost and development of newer drugs [6]. Recommendations of various expert groups regarding choice of drugs are available as treatment guidelines to reduce practice variability, cost and improve rational pharmacotherapy. Implementation of these guidelines has been shown to be effective in raising quality of antihypertensive therapy [7].

The 7th report of Joint National Committee on prevention, detection, evaluation & treatment of high blood pressure (JNC VII) recommends the use of thiazide type diuretics alone or in combination with drugs from other classes in uncomplicated essential hypertension. Presence of certain high risk conditions is indication for initiating therapy with other drug classes like ACE inhibitors, ARBs, Beta blockers or CCBs. For BP > 20/10 mm of Hg above goal BP, combination of two agents is recommended with one of them usually being a thiazide diuretic [8].

In such a scenario it is necessary to survey prescription patterns as a component of medical audit for monitoring, evaluation & necessary modifications in prescribing practices to achieve rational and cost effective medical care [9]. Keeping all these facts in mind, the present study was designed to analyze the prescribing patterns of anti hypertensive drugs & adherence to JNC VII guidelines in 500 hypertensive patients in a tertiary care hospital in North India.

Material and Methods

The study was approved by institutional ethics committee. Drug utilization data was collected from the 24 hour hospital pharmacy of Punjab Institute of Medical Sciences, Jalandhar for a period of 6 months from October 2010 to March 2011. Prescriptions of hypertensive patients with diabetes mellitus and bronchial asthma as co morbidities were also included. Age and sex of patients was recorded. Mean age along with SE was calculated. Z test was used to calculate the P value of age difference between two sexes. Depending on age patients were divided into 3 groups (< 40 years of age, 40 - 60 years & > 60 years of age). Antihypertensive drugs were divided into following 7 categories: ACE inhibitors, ARB's, Beta blockers, CCB's, Diuretics, Alpha adrenergic blockers and Central sympatholytics. Fixed drug combinations were counted separately. The components of FDCs were counted in their respective groups as well. Adherence to JNC VII guidelines was studied by assuming that drugs recommended as first line should be the most frequently prescribed ones with highest utilization.

Results

As shown in Table 1, 210 patients (42%) were males & 290 (58%) were females indicating 16% higher prevalence of hypertension in female population. Mean age of male patients was 57.04 ± 0.94 years and female patients were 52.71 ± 0.81 years. The age difference between two gender groups (p≤ 0.1) was statistically not significant.

Table 1- Demographic Profile of Patients

GENDER	NUMBER (n=500)	PERCENTAGE	MEAN AGE ± S.E.	P value (z test)
MALES	210	42	57.04 ± 0.94	0.1
FEMALES	290	58	52.71 ± 0.81	

Most of male hypertensive patients (43.3%) were in the age group of > 60 years & most of female patients (56.9%) were in the age group of 40 to 60 years indicating an earlier onset of hypertension in female population in our study group (Table 2).

Table 2- Age Group Distribution of Patients

	AGE GROUPS					
	<40 years		40-60 years		>60 years	
Category	Number	Percentage	Number	Percentage	Number	Percentage
Males	29	13.81	90	42.86	91	43.33
Females	57	19.65	165	56.9	68	23.45

15.8% of patients had diabetes mellitus & 3.8% had bronchial asthma as coexistent conditions (Table 3). The most frequently prescribed antihypertensive drug group was Angiotensin receptor blockers in diabetics (56.25%) as well as asthmatics (68.42%). None of the asthmatic hypertensive patient received beta blockers. Alpha adrenergic blockers & central sympatholytics were also not prescribed to any of the diabetic or asthmatic patient with hypertension (Table 4).

Table 3- Comorbidities Of The Patients

COMORBIDITY	NUMBER		TOTAL	PERCENTAGE
	MALE	FEMALE		
DIABETES	33	46	79	15.8
BRONCHIAL ASTHMA	9	10	19	3.8

Table 4- Treatment Of Hypertension In Diabetics and Asthmatics

	PERCENTAGE OF PATIENTS						
	ACEI	ARB	Beta Blocker	Calium Channel Blocker	Diuretics	Alpha Adrenergic Blockers	Central Sympatholytics
Diabetes	21.25	56.25	28.75	18.75	51.25	0	0
Asthma	15.79	68.42	0	21.05	57.89	0	0

Table 5- Frequency Of Administration Of Individual Drugs

ANTIHYPERTENSIVE GROUP	NAME OF DRUG	NUMER OF PRESCRIPTIONS
DIURETICS (53.4%)		
	HYDROCHLOROTHIAZIDE	106
	CHLORTHALIDONE	2
	SPIRONOLACTONE	55
	FUROSEMIDE	23
	TORSEMIDE	80
	METOLAZONE	1
ARB (42.6%)		
	LOSARTAN	55
	TELMISARTAN	95
	OLMESARTAN	63
BETA BLOCKER(38.6%)		
	METOPROLOL	117
	ATENOLOL	34
	PROPRANOLOL	23
	NEIVOLOL	12
	CARVEDILOL	6
	BISOPROLOL	1
CALCIUM CHANNEL BLOCKERS(26.4%)		
	AMLODIPINE	113
	DILTIAZEM	17
	NIFIDIPINE	1
	NICARDIPINE	1
ACE INHIBITOR (19.2%)		
	RAMIPRIL	86
	ENALAPRIL	10

Table 5 shows that diuretics was the most commonly prescribed group of antihypertensive drugs in 53.4% patients, followed by angiotensin receptor blockers in 42.6%, beta blockers in 38.6% & calcium channel blockers in 26.4% patients. Out of diuretics, thiazides group was the most commonly used (40.4%).

Table 6 again shows diuretics to be the most commonly prescribed group of drugs in all the three age groups viz < 40 years, 40 - 60 years & > 60 years. 42.6% patients received monotherapy and rest 57.4% combination therapy. 37% of total patients received two

drugs, 17.2% three drugs & 3.2% received four or more drugs (Table 7).

Table 6- Antihypertensives Prescribed In Different Age Groups

Age Group (Years)	ACEI	ARB	Beta Blockers	Calcium Channel Blockers	Diuretics	Alpha Adrenergic Blockers	Central Sympatholytics
< 40`	16.28	34.88	40.69	26.74	44.19	0	2.33
40-60	20	42.75	41.96	23.92	51.37	0.39	0
>60	19.5	46.54	32.07	30.19	61.63	1.26	0

Table 7- Number of Drugs Prescribed

Numer of antihypertensives	Number of prescriptions	Percentage
One drug	213	42.6
Two drugs	185	37
Three drugs	86	17.2
Four Drugs or more	16	3.2

(Monotherapy Vs Combination Therapy)
FDCs are quite frequently used in treatment of hypertension. 41.6% of all prescriptions had FDCs (Table 8).

Table 8- Frequency of Prescribing FDC's

FDC's	NUMBER OF PRESCRIPTIONS
Diuretics with ACE/ ARB, Beta blocker, CCB	97
Diuretics in combination	40
Beta Blocker + CCB	35
ACE Inhibitor/ ARB + CCB	28
3 drug FDC ARB+ CCB + Diuretic	8

Discussion

Hypertension is a worldwide problem. Its prevalence depends upon several ethnic, genetic, environmental & psychosocial factors. In India prevalence of hypertension (B.P. ≥ 140/90 mm of Hg) is reported to be 25-30% in urban & 10-15% in rural adults and it further increases with age. In elderly Indian population, a prevalence rate of 51.8% is reported [10]. Our study group also showed higher prevalence of hypertension in elderly patients (> 40 years). However, most females showed an earlier onset of hypertension than males. Main aim of antihypertensive therapy is to prevent hypertension related morbidity, mortality and complications. As antihypertensive prescription is required lifelong, therefore the side effects, quality of life and cost of drugs are also important aspects. Keeping all such factors in mind various prescribing guidelines have been formulated.

Guidelines given by Joint National Committee on prevalence, detection, evaluation and treatment of high blood pressure VIIth report suggest that treatment of choice for early stage, uncomplicated, essential hypertension should be thiazide diuretics. Presence of high risk conditions and blood pressure greater than 20/10 mm of Hg above normal is indication for starting therapy with drugs from other classes like ACE inhibitors, ARB's, beta blockers or calcium channel blockers alone or in combination with thiazides. Adherence to treatment guidelines can be monitored by several methods. Drug utilization studies are one such important method. Our data shows that JNC VII guidelines have been followed in totality in this study group. Thiazides are prescribed most frequently alone or in combination with other drugs. ARB's are the most frequently prescribed

group in hypertensive diabetics and asthmatics as angiotensin antagonism is reported to decrease the onset & progress of microvascular complications of hypertension and diabetes mellitus [11]. More than half (57.4%) of patients in this study group received two or more antihypertensive drugs. FDCs have also been quite frequently used (41.6%). This may be an attempt to improve patient compliance and reduce treatment costs. Such trend of multiple drug therapy in hypertension has also been reported in some other studies in India [6, 10].

Main limitation of drug utilization studies is the lack of detailed patient records for justifying the prescribed drugs based on grade of hypertension, presence of complications and previous drug therapy.

Abbreviations
Angiotensin converting enzyme inhibitors: ACE inhibitors
Angiotensin Receptor Blockers: ARBs
Calcium Channel Blockers: CCBs
Fixed Dose Combinations: FDCs
Blood Pressure: BP

References

[1] Kearney P.M., Whelton M., Reynolds K., Muntner P., Whelton P.K. and He J. (2005) *Lancet* 217- 223.
[2] Lawes C.M., Vander Hoorn S., Law M.R., Elliott P., Mac Mahon S. and Rodgers A. (2006) *J. Hypertens*, 24, 423-430.
[3] World Health Organization (WHO) *International Society of Hypertension (ISH)*. (2003) *J. Hypertens.*, 21, 1983-1992.
[4] Blood Pressure Lowering Treatment Trialists' Collaboration. (2000) *Lancet*, 356, 1955-1964.
[5] Staessen J.A., Wang J.G. and Thijs L. (2001) *Lancet*, 358, 1305-1315.
[6] Xavier D., Mathew N., Pradeep J. and Pais P. (2001) *Indian J. Pharmacology*, 33, 456-457.
[7] Avanzini F., Corsetti A. and Maglione T. (2002) *Am. Heart J.*, 144(4), 726-732.
[8] Chobanian A.V., Bakris G.L., Black H.R., Cushman W.C., Green L.A., Izzo J.L. Jr., Jones D.W., Materson B.J., Oparil S., Wright J.T. Jr. and Roccella E.J. (2003) *JAMA*, 21, 289, 2560-72.
[9] Gupta N., Sharma D., Garg S.K. and Bhargava V.K. (1997) *Indian J. Pharmacol.*, 29, 411-415.
[10] Augustine L., Prasanth N.V., Sanal Dev K.T., Jasmin S., Kappekkat Y., Shinu C. and Thayyil A. (2010) *Der. Pharma Chemica.*, 2(6), 332-341.
[11] European Society of Hypertension-European Society of Cardiology Guidelines Committee. (2003) *J. Hypertens.*, 21(6), 1011-53.