Assessment of Guideline Adherence and Hypertension Control in a Tertiary Care Hospital in Calicut

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ABSTRACT

Objectives: To evaluate the effect of guideline adherence in treatment of hypertension in a tertiary care hospital in Calicut. **Materials and Methods:** A prospective observational study was conducted for a period of 6 months with a follow up of 81 hypertensive prescriptions among 100 patients, who were admitted in PVS Hospital, Calicut. BP was the parameter assessed on the baseline and follow up after one month. The effects of empirical treatment were compared with treatment based on JNC 8 guideline. **Results:** In a total of 81 prescriptions, 32 (39.5%) prescriptions were found in the age group of ≤60 years, in which 12 (37.5%) were males and 20 (62.5%) were females and 49 (60.5%) prescriptions were comes under the age group of >60 years, in which 34 (69.39%) were males and 15 (30.61%) were females. Among monotherapy, 14 (35%) prescriptions had ARBs as antihypertensive drug followed by diuretics 12 (30%), beta blockers 6 (15%), ACE Inhibitors 4 (10%) and Calcium Channel Blockers 4 (10%). About 59.26% of the medical records showed good level of JNC- 8 guideline adherence. This adherence has significant negative association only with diabetes mellitus comorbidity ($p=0.0152$, Ø = -0.241) not with other co morbidities. Among 81, 69 (85.18%) patients were on goal BP on second visit. However BP control have a positive association with guideline adherence ($p=$ 4.6E-05, Ø =0.275) and negative association with mono therapy ($p<0.01$, Ø = -0.108). **Conclusion:** Prescribing practices were fairly compliant with guidelines. Doctors poorly adhered to guidelines in hypertensive patients with Diabetes. Significantly better hypertension control was seen in patients who were on guideline adherent therapy.

Key words: JNC 8 Guideline, Adherence, BP control, Monotherapy, Co Morbidity, Antihypertensive.

INTRODUCTION

Hypertension is currently the most common chronic disease in clinical practice and carries a substantial global burden to patients, physician and healthcare system. Hypertension or high blood pressure sometimes called arterial hypertension is a chronic medical condition, in which the blood pressure in the arteries is increased. According to the report of Joint National Committee for detection, evaluation and treatment of blood pressure, Hypertension is defined as a clinical state where the systolic BP is above 139 mmHg and the diastolic BP is above 89 mmHg.[1,2]

Patients with mild hypertension can be assessed for the level of risk while offered lifestyle advice. The diet emphasizes fruit, vegetables and low fat diary in addition to fish, low fat poultry and whole grains while minimizing red meat, confectionary and sweetened drinks. In the general population aged ≥60 years, initiate pharmacologic treatment to lower BP at systolic BP (SBP) ≥150 mmHg or diastolic BP (DBP) ≥ 90mmHg and treat to a goal SBP <150 mmHg and goal DBP <90 mmHg. In all persons <60 years or in persons >18 years (and either those younger or older than 60 years either with diabetes or CKD), initiate pharmacologic treatment to lower SBP≥ 140 or DBP≥90 mmHg and to treat to a goal BP of <140/90 mmHg. First-line and later-line treatments should now be limited to 4 classes

of medications: Diuretics (D), Calcium channel blockers (CCBs), Angiotensin converting enzyme inhibitors (ACEI) and Angiotensin receptor blockers (ARB). Second- and third-line alternatives included higher doses or combinations of ACE inhibitors, ARBs, thiazide-type diuretics, Beta blockers and CCBs.

Observational studies have shown that the health care provider's attitudes, behaviour towards hypertension management and deviation from the clinical practice guidelines account for more than 66% of the poor control of hypertension.[3] According to WHO estimate at least a billion people in the world are living with hypertension and about 7.1 million mortality annually.[4] The prevalence of hypertension is increasing and is predicted to grow by more than 500 million by 2025.[5] In India, hypertension is the leading non communicable disease risk and estimated to be attributable for nearly 10% of all deaths. Adult hypertension prevalence was risen dramatically over the past 3 decades from 5% to between 20-40% in urban areas and 12-17% in rural areas.[14]

The study was conducted to evaluate doctor's adherence to medication recommendations of JNC 8 guidelines on management of hypertension. In addition, this study also aimed to evaluate factors associated with guidelines adherence and hypertension control in established hypertensive patients with cardiovascular diseases.

MATERIALS AND METHODS

This prospective observational study was conducted in the inpatients wards of PVS hospital [P] Ltd, for 6 months (October 2017 – April 2018). The study was conducted after attaining approval from the institutional ethics committee of the hospital and informed consent form was obtained from the eligible patients. Patients were selected on the basis of inclusion criteria and exclusion criteria. Patients with age group >18 years, hypertension with or without cardiovascular disease, hypertension with or without diabetes mellitus and patients receiving antihypertensive drug alone or in combination are included in the study. Patients who have mental incapability, pregnant patient were excluded from the study. On first visit of every patient, a validated data collection form was used to collect patient's bio demographical data such as age, sex, occupation, clinical and therapeutic data, such as initial systolic BP, diastolic BP and antihypertensive agents prescribed. Based on JNC 8 guideline, a treatment plan has been developed and checked for guideline adherence. On second visit of every patient (after one month) BP were noted and categorized either as controlled or uncontrolled. Statistical analysis was performed using chi-square test and SPSS software 4 windows version 20.

RESULTS

Demographic and Clinical characteristics

The mean age of the selected patients was 63.65 years and 33 (40.74%) of them were female and 48 (59.26%) of them were males. Mean SBP and DBP at presentation were 155 mmHg and 85 mmHg respectively. Among 81 patients 34 (41.97%) had no comorbidities, 26 (32.12%) had single comorbidity, 19 (23.45%) had two comorbidities and 2 (2.46%) had three comorbidities respectively. The most common comorbidity was diabetes mellitus with 35 (43.26%) having this condition, followed by coronary artery disease /dyslipidemia 16 (19.75%), recurrent stroke 12 (14.81%) and chronic kidney disease 2 (2.46%). Gender and age wise distribution of comorbidities are represented in Table 1.

Table 1: It shows gender and age wise distribution of co morbidities.					
Variable	**Gender**		**Age**		**Total**
	Male N(%)	**Female N(%)**	**≤60 yrs N(%)**	**>60 yrs N(%)**	
No: of Co morbidities 0	24(70.58)	10(29.42)	20(58.82)	14(41.18)	34
1	16(61.54)	10(38.46)	10(38.46)	16(61.54)	26
2	8(42.11)	11(57.89)	2(10.52)	17(89.48)	19
3	-	2(100)	-	2(100)	2
DM	16(45.71)	19(54.29)	6(17.14)	29(82.86)	35
CAD/DYP	8(50)	8(50)	-	16(100)	16
CKD	2(100)	-	-	2(100)	2
Recurrent Stroke	4(33.33)	8(66.67)	4(33.33)	8(66.67)	12

DM- Diabetes mellitus, CAD/DYP- Coronary artery disease/ Dyslipidaemia, CKD- Chronic kidney disease

Prescribing pattern

Among 81 patients, 40 (49.35%) received monotherapy 41 (50.62%) received multiple drug therapy, in which 35 (43.20%) received two drug, 4 (4.93%) received three drug and 2 (2.46%) received four drug regimen. ARBs (35%) were the most commonly used mono therapeutic agent, followed by diuretics 12 (30%), beta blockers 6 (15%) ACE inhibitors 4 (10%) and calcium channel blockers 4 (10%). Mono therapy drug utilization pattern is represented in Figure 1.
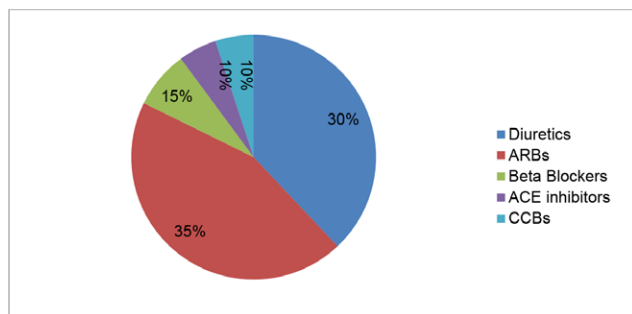
Figure 1: It shows monotherapy drug utilization pattern.
ARBs- Angiotensin receptor blockers, ACE- Angiotensin converting Enzyme, CCBs- Calcium channel blockers

In 2 drug combination regiment Diuretics+ ARB 11 (28.57%) was most commonly prescribed and in 3 drug combination regiment diuretics + ARB + CCB is the only preferred combination. Combination therapy drug utilization pattern is represented in Table 2.

Table 2: It shows combination therapy drug utilization pattern.

Combination therapy	N(%)
Dual therapy	
D+CCB	5(14.28)
D+ACE Inhibitors	6(17.14)
D+ ARB	10(28.57)
D+ Beta blocker	2(5.71)
ARB+ CCB	5(14.28)
Beta blocker+ CCB	4(11.42)
ARB + Beta blocker	2(5.71)
Triple therapy	
D+ ARB+ CCB	4(100)
Quadruple therapy	
D+ ARB+ CCB+ Beta blocker	2(100)

D- Diuretics, ARBs- Angiotensin receptor blockers, ACE- Angiotensin converting Enzyme Inhibitors, CCBs- Calcium channel blockers

Clinical practice guideline adherence

48 patients (59.26%) received JNC-8 guideline compliant therapy. JNC 8 guideline adherence have a statistically significant negative association with diabetes mellitus ($\varnothing$= -0.241, *p* = 0.015). No statistically significant association was found between guideline adherence and any other variable (Table 3).

Table 3: JNC 8 Guidelines adherence association with co morbidities.

Variables	JNC-8 adherence		P value	Association
	Yes	No		
Prescription status	48(59.26%)	33(40.74%)		
DM				
Yes	16(47.05%)	19(52.95%)		
No	32(64.56%)	14(30.43%)	0.0152	$\varnothing$=0.241
CAD/ DYP				
Yes	8(50%)	8(50%)		
No	40(62.5%)	25(37.5%)	0.399	Nil

DM- Diabetes mellitus, CAD/DYP- Coronary artery disease/ Dyslipidemia

Hypertension control

69 (85.18%) were on goal BP on follow up. Hypertension control was found to have a statistically significant positive association with guideline adherence ($\varnothing$= 0.275, *p*=4.6E-05) and while statistically significant negative association with mono therapy ($\varnothing$= -0.168, *p*- <0.01), no statistically significant association was found between hypertension control and any other variable (Table 4)

Table 4: It shows factors associated with JNC 8 Guidelines adherence.

Variable	BP control		P value	Association
	Yes	No		
Prescription status	69(85.18)	12(14.82)		
Guideline adherence				
Yes	48(100)	0	4.6E-05	$\varnothing$=0.275
No	21(63.63)	12(36.36)		
DM				
Yes	29(82.85)	6(17.14)	0.255	Nil
No	40(86.95)	6(13.04))		
CAD/DYP				
Yes	12(75)	4(25)	0.0857	Nil
No	57(87.69)	8(12.30)		
Mono Therapy				
Yes	29(72.5)	11(27.5	<0.01	$\varnothing$=-0.168
No	40(97.56)	1(2.44)		
ARBs				
Yes	39(90.69)	4(9.31)	0.377	Nil
No	30(84.21)	8s(15.78)		

DM- Diabetes mellitus, CAD/DYP- Coronary artery disease/ Dyslipidemia, ARBs- Angiotensin receptor blockers

DISCUSSION

In the present study ARBs (35%) were the most commonly prescribed drugs for hypertensive patients followed by diuretics (30%). In many of other studies diuretics were the most frequently prescribed group of drugs,[1,4] whereas in a study by Anand Kale *et al*.[5] calcium channel blockers (49%) were the most frequently prescribed drug for hypertensive patients followed by diuretics (43.5%). Because of better antihypertensive efficacy of ARBs, they were preferred as better mono therapeutic agent in our study.

A combination of diuretics and angiotensin receptor blockers were the leading drug combination (28.57%) prescribed in our study. This data is similar to that of study by Anand kale *et al*.[5] Always rapid BP lowering with 3 drug combinations or 4 drug combinations were recommended for cardiovascular complications. Since our study have less no. of cardiovascular complications (19.75%), three drug combinations (4.3%) and four drug combinations (2.46%) are rarely used.

In our study we found an overall fair level of adherence to medication recommendations of JNC 8 guideline. About two third (59.26%) of the total prescriptions were in compliance with JNC 8. This findings were in contrast to some other studies conducted in Malaysia, which have reported poor adherence to guidelines, but is in compliance with some studies which have reported good adherence to guidelines.[6] In the present study, JNC 8 guideline was found to have negative association with DM. Similar report of doctor's poor compliance to hypertension guidelines while treating hypertension in diabetic patients were observed in a study by Nafees Ahmed *et al*.[1] In some other studies guideline recommended hypertension management was found to have significant association with co morbidities such as coronary artery disease and myocardial infarction.[7]

In our study, majority of the patients (85.18%) were at goal BP on second visit, a rate that was more than 3 times that of the Malaysian national bench mark of hypertension control (26.8%). Hypertension control in our study was much higher than a multicentre study conducted in Malaysia in which 48.5% of the patients had achieved controlled BP.[1] Reason for this better hypertension control while comparing with other studies might be, the doctor's greater compliance to hypertension guidelines. Better control of hypertension in patients suffering from cardiovascular disease might be due to fact that physicians pay more attention to patients with critical disease and they become more aware about the needs to maintain BP goal levels, once organ and vascular complications present.[8]

Hypertension control had statistically significant positive association with JNC 8 guideline adherence and negative association with mono therapy. This finding was in compliance with a study conducted in Malaysia where adherence to recommended practices resulted in better hypertension control. The efficacy of mono therapy in patients at high and lower risk of cardiovascular co morbidities such as CHF, CVA, CKD and Diabetes has been demonstrated by several large clinical trial.[9,10] Due to this reason mono therapy is not preferred as a better choice for cardiovascular co morbidities, even in hypertensive emergencies.[11,12,13] Majority of patients in our study were suffering from these conditions and they were preferred with monotherapy also.

Guideline adherence was found to have statistically negative association with diabetes. Similar poor guideline adherence in diabetic patients was reported by a study conducted in Malaysia, where only 31% diabetic hypertensive patients achieved the target BP of less than 130/80 mmHg.[14] In our study majority of the diabetic hypertensive patients were prescribed with beta blockers which are contraindicated for diabetes, where as in some other studies conducted by Jorg C. Brokmann *et al*. and Sivasakthi Raju *et al*. the use of beta blockers in diabetic patient was very minimal.[15,16,17,18] One possible reason for this contra indicated prescribing practice could be, doctors give more attention to immediate BP control by using beta blockers and glycaemic level monitoring.

CONCLUSION

Overall prescribing practices were in fair compliance with guidelines but still have a room for further improvement. Compliance to JNC 8 guideline resulted in better hypertension control in patients suffering from cardiovascular co morbidities. Poor adherence to guidelines in patients suffering from Diabetes mellitus and poor control among patients receiving mono therapy are the areas which need further probing and focus in the future. Different strategies like continuous medical education, seminars, reminder tools and the availability of clinical pharmacist to participate in collaborative practices and motivating patients to participate in BP goal achievement could increase guideline adherence and hypertension control.

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CONFLICT OF INTEREST

The authors have no conflict of interest.

ABBREVIATIONS

BP: Blood Pressure; **JNC:** Joint National Committee; **D:** Diuretics; **CCB:** Calcium Channel Blockers; **ACEI:** Angiotensin Converting Enzyme Inhibitors; **ARB:** Angiotensin Receptor Blockers; **DM:** Diabetes Mellitus; **CAD:** Coronary Artery Disease; **DYP:** Dyslipidemia; **CKD:** Chronic Kidney Disease.

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