ASSESSMENT OF PROFESSIONAL'S ADHERENCE TO JOINT NATIONAL COMMITTEE 8 GUIDELINES IN THE MANAGEMENT OF HYPERTENSION

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ABSTRACT

Objectives: Hypertension is the most insidious ailment in primary care with its management being a daily affair. The avail of antihypertensive medications has affirmed their efficacy in blood pressure alleviation. Yet, the methodical choice of medication with which treatment ought to commence at the precise blood pressure threshold and maintained at a target level was undiscerned. Consequently, the Eighth Joint National Committee grants an evidence-based tool, which was employed in the appraisal of professional's adherence to joint national committee 8 guidelines.

Methods: A prospective, observational study was governed. Aggregate patients with hypertension with/without diabetes mellitus (DM) and/or chronic kidney failure admitted in general medicine and the dialysis unit of the tertiary health care hospital, for 4 months were enrolled. The rationality of antihypertensive medications and target blood pressure was noted.

Results: Patients matriculated to 125, 90 males and 35 females. Average age perceived was between 51 and 60 years, with the length of stay 14.39 (standard deviation [SD]±1.52) and 9.3 (SD±0.46) days in the respective unit. The gross medication endorsed represents 1085 medications, incorporating 337 antihypertensive medications. The optimal choice of an antihypertensive medicine was clonidine and amlodipine. Adherence in the populace with lone hypertension was cent percent, trailed by hypertension with DM 82.35% and minimal in hypertension with chronic kidney disease.

Conclusion: 86-medication compiled adherence to the guidelines (25.52%). Rationality of medication depicts 25.6% were rational and 73.6% distinguish as non-rational, amid a demise of a sole victim. A significant high-grade defiance of health-care practitioners to the Eighth Joint National Committee guidelines was evidenced from our study.

Keywords: Joint national committee 8, Adherence, Hypertension, Medication regimen.

INTRODUCTION

Hypertension asserted by the World Health Organization as high or elevated blood pressure. An infirmity in which the blood vessels has persistently escalate pressure, fostering the heart to pump harder [1]. It is the most insidious ailment in primary care with its management being a daily affair [2]. Clinching an asymptomatic complexion has secured it as an alias of "the silent killer" [3]. The expectancy of encountering hypertension is gauged at 90% [4], with it affecting nearly 26% of adult population currently and projected to affect 1.56 billion (29%) of the world's adult population by 2025. Its pervasiveness in India is 66 million with 34 million in urban and 32 million in rural areas [5]. India is cruising through a demographic metamorphosis as a developing country with an amplification in population trends. This momentous proliferation of life can genesis non-communicable disease toward eclipsing infectious disease that implicates a stain on the health finances of the country [6].

Hypertension and diabetes mellitus (DM) are overt to coexist in various populations [7]. In accordance with the WHO, DM incidence in adults worldwide was accounted for 4.0% in 1995. It is predicted to levitate to 5.4% by the year 2025. The adulated populace would mount from 135 million in 1995 to 300 million in the year 2025. The peril of cardiovascular disease amplified by an aspect of two to three in DM populace with every level of systolic pressure [8]. In inhabitants of DM in tandem with hypertension, an attenuation in blood pressure poses an early benefit in results and enhanced cost-effectiveness, then maintaining a taut control over blood glucose levels [9]. DM is cardinal in conjunction with hypertension designated the secondary source, yet an autonomous menace in end-stage renal disease (ESRD). The sequentially chronic renal disease can instigate or be a consequence of hypertension [10]. Predominantly, renal disease populace is inflicted with hypertension as well, thus navigating to the deterioration of kidney function. Hence, the preventive stratagem in ESRD ought to comprise the prevention, treatment, and control of blood pressure [11].

Up until 1950, there was no effectual treatment available in the management of hypertension. With the development of antihypertensive and their efficacy in plummeting blood pressure in the past 3 decades has tinted it as a therapeutic coup [12]. Conversely, the proficient choice of an antihypertensive medication with which treatment ought to be instigated, at precise blood pressure threshold and sustain at target level was unresolved [13]. Therefore, the Eighth Joint National Committee on the prevention, detection, evaluation, and treatment of elevated blood pressure endows an evidence-based tool for a physician in the clinical advance of hypertension management [14]. The Joint National Committee is punctilious as the "golden standard" hypertension management [15]. The 2014 Joint National Committee-8 (JNC-8) guidelines encompass rigorous scientific evidence and nine recommendations comprised by reviewing studies of hypertensive natives aged eighteen and elder [16]. They urge the use of four types of medication - calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and diuretics on mainstay of randomized control trial evidence, with explicit recommendations according to race, chronic kidney disease (CKD), or diabetic status [17].

The current study aims to analyze the comorbidities in the populace deliberated, assess the physicians prescribing pattern of

antihypertensive medications, its rationality, and adherence to JNC-8 guidelines. Rational prescription pattern utilizes the least number of medicaments to obtain the best possible therapeutic outcome in the shortest time duration. The management of hypertension requires both pharmacological and non-pharmacological methods [18]. Therefore, compliance with such guideline grants stanchion, due to an optimal management of an independent citizen's treatment regimen.

MATERIALS AND METHODS

A prospective observational study was undertaken in the general Medicine and Dialysis Department of Father Muller Medical College Hospital, Mangalore, India. For a duration of 4 months, from November 2016 to February 2017, after the authorization of the institutional ethics committee (FMMC/FMIEC/3054/2016). A sum of 125 individuals was integrated into the study. All hypertension populaces of age 18–60 years admitted to the inpatient general medicine and dialysis in and outpatient ward, including folks with comorbidities of DM and/or CKD were incorporated. While patients with incomplete data or those reassigned to other departments in the span of 24 hours were excluded. The inhabitant's information was compiled and documented in the data collection form generated. Medication adherence and rationality were assessed by weighing it against the treatment algorithm calibrated by the Eighth Joint National Committee of hypertension management. Medication units consumed were appraised by computing its daily define dose.

Statistical analysis

Statistical software SPSS (version 20) was employed for data analysis. Descriptive statistics such as percentages were reckoned for categorical variables. The mean and the standard deviation were employed to estimate continuous variables. Graphic representations were performed using Microsoft Excel 2007 for visual interpretation of analyzing data.

RESULTS

A total of 125 prescriptions were analyzed, 69 received from general medicine and 56 from dialysis ward. The study constituted of 90 (72%) males and 35 (28%) females populace. The age allocation was foremost seen amid 51–60 years (44%) and minimal in 18–28 years (5.6%), retaining a mean of 31.3 (standard deviation [SD]±23.8). The average length of stay was 14.39 (SD±1.52) and 9.3 (SD±0.46) days in the respective wards.

On appraising the aggregate of medication prescribed, 1085 medicines were achieved. The recurrent integer of medication consumed per individual was estimated at 6–10 (37.7%) with a bare minimum of 1–5 (29%) medications, preserving a mean of 14.9 (SD±1.5). Correspondingly, the antihypertensive medications cumulated to 337, with peak quantity consumed 3–4 (45.6%), shadowed by 1–2 (44.8%), and ≥5 (9.6%), with mean 41.7 (SD±25.7) (Table 1).

The survey of 125 populaces acquired 7 (5.6%) lone hypertension individuals, in conjugation with 17 (13.6%) inhabitants possessing DM, 65 (52%) people with chronic kidney failure, and 36 (28.8%) patients have both of them as comorbidity (Fig. 1).

The overview of this study furnishes amlodipine as the most substantial prescribed antihypertensive medication with 1.95 units utilized. The predominant therapy spotted was triple combination therapy 35 (28%), succeeded by monotherapy 31 (24.8%), double combination therapy 31 (24.8%), and trailed by multiple combination therapy 28 (22.4%) (Table 2).

When contemplating the class of medication prescribed in hypertension and its comorbidities, the predominant choice of medication was CCBs, pursued by ARBs in hypertension lone patients, similarly, β blockers in populaces with DM, α2 agonist in individuals with CKD as comorbidity, and ARBs in inhabitants with both as comorbidity as shown in Fig. 2. The corresponding unit of

Table 1: Demographic data and patient details

Characteristics	Number of patients (%)
Gender	
Male	90 (72)
Female	35 (28)
Age distribution	
18–28	7 (5.6)
29–39	15 (12)
40–50	48 (38.4)
51–60	55 (44)
Mean±SD	31.3±23.8
Total medications prescribed	
1–5	24 (19.2)
6–10	75 (60)
≥11	26 (20.8)
Mean±SD	41.7±28.9
Antihypertensive medications prescribed	
1–2	56 (44.8)
3–4	57 (45.6)
≥5	12 (9.6)
Mean±SD	41.7±25.7
Length of stay in general medicine department	
1–5	20 (29)
6–10	26 (37.7)
11–15	11 (15.9)
≥21	6 (8.7)
Death	1 (1.4)
Mean±SD	14.9±1.5
Length of stay in dialysis department	
Twice in a week	39 (69.6)
Thrice in a week	17 (30.4)
Mean±SD	9.3±0.5

SD: Standard deviation

Table 2: Prescribing pattern of antihypertensive medications

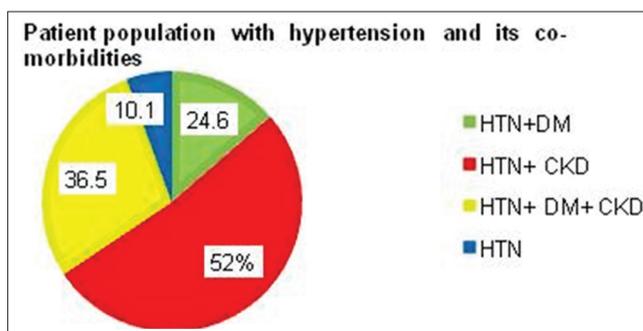| Treatment	Number of prescriptions (%)
Monotherapy	31 (24.8)
CCBs	18 (58.06)
Double combination therapy	31 (24.8)
CCBs+α_2 agonist	7 (22.58)
Triple combination therapy	35 (28)
CCB+α_2 agonist+diuretics/β blocker	5 (14.28)
Multiple therapy	28 (22.4)
CCBs+CCBs+β blockers+α_2 agonist	6 (21.43)

CCBs: Calcium channel blockers

Fig. 1: Disease distribution

antihypertensive medication consumed by total populace is depicted in Table 3.

The adherence attained in the populace with hypertension lone was cent percent. Minimal adherence was ascertained in hypertension with

Table 3: Antihypertensive medication utilization

Medication class	Generic name	ATC code	Route of admission	Daily defined dose (g)	Number of prescription	Total units consumed (g)	Daily defined dose/100-bed days
Angiotensin-converting	Enalapril	$C_{09}AA_{02}$	Oral	0.01	6	2.75	0.022
enzyme inhibitors	Ramipril	$C_{09}AA_{05}$	Oral	0.0025	5	5	0.221
β-blockers	Atenolol	$C_{07}AB_{03}$	Oral	0.075	5	3.8	0.0032
	Bisoprolol	$C_{07}AB_{07}$	Oral	0.01	1	1	0.0082
	Metoprolol	$C_{07}AB_{02}$	Oral	0.15	7	25.32	0.0488
	Propranolol	$C_{07}AA_{05}$	Oral	0.16	1	0.125	0.00006
	Timolol	$C_{07}AA_{06}$	Oral	0.02	5	25	0.102
$α_2$ agonist	Clonidine	$C_{02}AC_{01}$	Oral	0.00045	50	48555.3	1190.1
CCBs	Amlodipine	$C_{08}CA_{01}$	Oral	0.005	55	57	1.954
	Cilnidipine	$C_{08}CA_{14}$	Oral	0.01	49	68	0.9451
	Nifedipine	$C_{08}CA_{05}$	Oral	0.03	26	13.26	0.065
ARBs	Telmisartan	$C_{09}CA_{07}$	Oral	0.04	10	16	0.01949
Thiazide-type diuretics	Furosemide	$C_{03}CA_{01}$	Oral	0.04	5	8	0.01169
			Parenteral		9	12	0.024
	Torsemide	$C_{03}CA_{04}$	Oral	0.015	22	39.36	1.0804
	Metolazone	$C_{03}BA_{08}$	Oral	0.005	1	1	0.016
α-blocker	Prazosin	$C0_2CA_{01}$	Oral	0.005	6	6	0.654
α+β blocker	Labetalol	$C_{07}AG_{01}$	Oral	0.6	7	7.96	0.00073
	Carvedilol	$C_{07}AG_{02}$	Oral	0.0375	21	2.46	0.0226
Vasodilator	Hydralazine	$C_{02}DB_{01}$	Oral	0.1	15	2.5	0.0044

ATC: Anatomical therapeutic chemical, ARBs: Angiotensin receptor blockers, CCBs: Calcium channel blockers
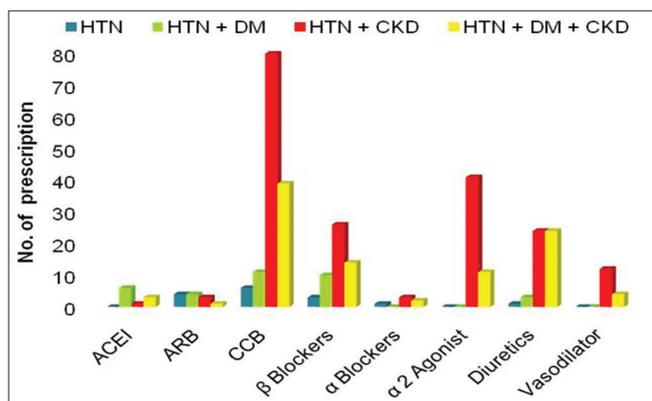

Fig. 2: Antihypertensive medication class prescribed for hypertension with its comorbidities

DM and CKD 19 (7.7%). Adherence of antihypertensive medication was 86 (25.52%). The investigation of populace blood pressure on admission to the hospital confers 11 inhabitants with normal blood pressure, in collaboration with 20 prehypertension, 36 Stage I hypertension, and 58 Stage II hypertension. The demise of a sole victim was witnessed. The rationality of antihypertensive medications portrayed, 32 (25.6%) rational while 92 (73.6%) were non-rational (Table 4).

DISCUSSION

Hypertension represents a predominant medical condition worldwide, a principal cause of stroke and a primary menace for coronary artery disease and its complications. The vital goal of treating it is to preclude and dwindle the prospect of hypertension-associated morbidity and mortality. The Eighth Report of the Joint National Committee on the prevention, detection, evaluation, and treatment of high blood pressure bequeaths a prominent evidence-based clinical guideline for the management of hypertension. The overview of this study depicts the incidence of hypertension was 90 (72%) males and 35 (28%) female, which is parallel to the findings of Kothari N and Ganguly B, where primacy was top in male 474 (52.7%) than in female 425 (47.3%) [14]. The age allocation in our survey was chiefly amid 51–60 years (44%) and least in 18–28 (5.6%), this is contradictory to the analysis bared by Tadvi AY and Bandi JR, in which there were 73 hypertensive participants, 12 (16.4%) in 20–25 years, 16 (21.9%) in 26–

30 years, 24 (32.9%) participants between 31 and 35, and 21 (28.8%) in the age group of 36–40 years [19]. The present study confers the sum of antihypertensive medications prescribed to be 337. The repeated count consumed by inhabitants was 3–4 (45.6%), trailed by 1–2 (44.8%), and ≥5 (9.6%) medications. This is on par with that uncovered by Shah *et al.*, in which a total of 63 antihypertensive medication were prescribed for 50 patients, where 38 (76%) received one medication followed by 11 (22%) who received two and 1 patient (2%) who received three medications of different antihypertensive class, respectively [20]. Of the 125 populaces appraised, 7 (24.6%) were lone hypertensive, 17 (13%) had DM, and 65 (10.1%) had chronic kidney failure as comorbidity, whereas 36 (28.8%) had both of them as comorbidities. This challenge, the investigation was done by Mohan, was among the 325 patients, 71.42% had DM with hypertension, and 28.57% had respiratory disorders with hypertension [21]. The predominant therapy was triple combination 35 (28%), succeeded by monotherapy 31 (24.8%), double 31 (24.8%), and trailed by multiple combination therapy 28 (22.4%) which was paradoxical to the examination undertaken by Kothari N and Ganguly B that showed 45.60% of patients were stabilized on monotherapy, whereas 54.4% of patients were on multiple medication therapy [14]. The outcomes of this study exhibit, CCBs represent the prime choice of antihypertensive class, pursued by ARBs in hypertensive lone patients, similarly, β-blockers in populaces with DM, α2 agonist in individuals with CKD as comorbidity, and ARBs in inhabitants with both as comorbidities. When comprehending the substantial antihypertensive medication prescribed, amlodipine attained that spot with 1.95 units being consumed, an analysis conducted by Sweileh *et al.* gainsaid these findings by stating that ACE-I was the most common medication class both in mono and combination therapy [22]. The conclusion met in our study portrays, adherence attained in the populace with hypertension lone was cent percent. Minimal was ascertained in hypertension with DM and CKD 19 (7.7%). The adherence of populaces in disease state corresponds an adherence of 86(25.52%) antihypertensive medications. This defies the finds of Kothari N and Ganguly B [14], in which 60% of antihypertensive prescribed in this group did not follow JNC-8 and the WHO guidelines. The recent study provides a limited external validity, as the sample obtained was not a representation of an entire population; it represents only the populace that was acquainted with the hospital where the investigation was executed. A certain amount of recall bias may be absorbed, as information concerning patient treatment was attained from medical records, thus posing a minimal limitation.

Table 4: Rationality of therapy based on JNC-8 treatment algorithm

Category	Normal 120/80 mm Hg	Prehypertension 120–139 or 80–89 mm Hg	Stage I hypertension 140–159 or 90–99 mm Hg	Stage II hypertension≥160 or≥100 mm Hg	The selection of medications based on JNC-8 algorithm-implement lifestyle interventions throughout the management of the disease state	Rational	Non-rational
Hypertension	1	1	1	4	Initiate thiazide-type diuretic or ACEIs or ARBs or calcium channel inhibitors, alone or in combination	4	7
Hypertension+DM	3	3	3	8		6	14
Hypertension+CKD	6	7	22	30	Initiate ACEIs or ARBs, alone or in combination with other medication class	7	29
Hypertension+DM+CKD	1	9	10	16		15	42
Total=125 patients	11	20	36	58		32 (25.6%)	92 (73.6%)

JNC-8: Joint national committee-8, ACEIs: Angiotensin-converting enzyme inhibitors, CKD: Chronic kidney disease

CONCLUSION

This prospective, observational study was embarked to investigate the prescribing patterns of antihypertensive medication, its adherence, and rationality with JNC 8 guidelines of hypertension management. The core findings propose that triple combination therapy was essentially prescribed, hypertension with CKD was the chiefly surveyed disease state. The predominant predilection for medication was CCBs. Rationality and adherence were revered at 25.6% and 25.5%. In this contemporary scenario, vaster populations of hypertensive individuals are afflicted with comorbidities. Contrarily, it is a sovereign peril for major disease conditions. Hence, the key to optimizing patients' quality of life is preliminary blood pressure management. The lack of implementation of treatment algorithm has yielded a suboptimal adherence and rationality in the medication prescribed. Thus, education of professional's about adherence to currently available and beneficial guidelines in patient's therapy is crucial. Maintaining individual target blood pressure with a habitual checkup retaining a clinical pharmacist to provide knowledge about the imperatives of adherence to lifestyle modification and medication prescribed can be beneficial in treatment management.

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AUTHORS' CONTRIBUTION

All four authors have constituted a substantial contribution to the study concept, data collection, its analysis, and interpretation. All authors have partaken in drafting the manuscript and in its final submission.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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