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To Study the Prescription Pattern of Antihypertensive Drugs in Teerthanker Mahaveer Hospital Moradabad (U.P.)

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Abstract: Objective of the study: To assess prescribing pattern of antihypertensive drugs use and adherence to various clinical guidelines in the Hospital. **Materials and methods:** A prospective observational study was carried out for a period of six months in the IPD and OPD tertiary care hospital. Prescriptions were analyzed during the study period. All the patients of age ≥ 20 (20-70 age) years with or without comorbidities, including males and females, who were diagnosed with hypertension as per JNC 8, ESH/ESC, NICE, STG, IHG, and receiving antihypertensive drugs were included. **Discussion:** The results of our study suggested that out of the total number of hypertensive patients (202) males were 54.45% and females were 45.55%. Therefore, there was immensely need of proper awareness about the hypertension and its etiologies among the population especially of younger generation. In this scenario, clinical pharmacist could do a lot more for the patients and overall society because of their expertise in Pharmaceutical Care. **Conclusion:** Calcium channel blockers, Diuretics, ARB as monotherapy and ARB with CCB as combination therapy were the choices for the treatment of Hypertensive patients as a single drug and combination drug therapy. As per the JNC 8 & ESC/ESH guidelines majority of the prescription patterns were achieved and found optimal at the study site.

Introduction:

Hypertension is defined as the increased pressure of blood on arteries and veins lateral walls.¹

Abnormal High Blood Pressure is one of the cardiovascular causes which include various etiologies which is linked to functional and structural cardiac, renal and optic pathologies that ultimately increases mortality and morbidity.² Worldwide prevalence of hypertension is estimated to be as large as one billion and its prevalence is predicted to increase by approximately 60% by 2025.³ Various guidelines are available for clinical treatment of high blood pressure such as WHO guidelines, ESC/ESH guidelines, NICE guidelines, STG, Indian hypertension guidelines and JNC-8 of USA on the evaluation, prevention, and management of hypertensive illness.⁴ Various antihypertensive drugs are present in market but clinicians have to choose the drug based upon effectiveness, side-effects and cost of drugs.⁵ In terms of mortality, elevated BP is the most significant to which 13% of global loss of life significantly attributed. Hypertensive illness is the 4th contributor mortality in developed countries.⁶ Factors according to pathophysiology of hypertensive illness include: genetics, excess sodium intake and/or abnormal sodium retention by the kidneys, invariably activated Renin-Angiotensin-Aldosterone System, as well as activation of the elevated peripheral arterial resistance and sympathetic autonomic nervous system (SNS).⁷ The primary hypertension patient may be generally asymptomatic or may impose serious cardiovascular disease risk factors, perhaps America Heart Association mentions cardiovascular risk factors associated with age, gender, heredity, smoking, high lipid profile, and obesity and overweight DM.⁸

Hypertensive illness is instantly responsible for 57% stroke and 24% CAD deaths in India. If uncontrolled hypertension occurs it can lead to IHD, cardiac failure, MI, chronic renal insufficiency & stroke.⁹ Among the most important and most widely used drugs are thiazide diuretics, calcium channel blockers, ACE inhibitors, angiotensin II receptor antagonists (ARBs), and beta blockers.¹⁰ Which type of medication to use initially for hypertension has been the subject of several large studies and

resulting national guidelines.¹¹ The fundamental goal of treatment should be the prevention of the important endpoints of hypertension, such as heart attack, stroke and heart failure.¹² Patient age, associated clinical conditions and end-organ damage also play a part in determining dosage and type of medication administered.¹³ The several classes of antihypertensive differ in side effect profiles, ability to prevent endpoints, and cost.¹⁴ The choice of more expensive agents, where cheaper ones would be equally effective, may have negative impacts on national healthcare budgets.¹⁵

Table 1: Modifications of lifestyle to manage HTN

<i>Modifications lifestyle to manage HTN</i>	<i>Modifying Recommendation</i>	<i>Determine SBP Reduction (range between)</i>
Decrease in Body Weight	Maintain normal weight (BMI 18.5-24.9 kg/m ²).	5-20 mmHg/10 kg
Adopt DASH diet plan	Intake of veg-diet, and with low fat diet content of saturated, total fat.	8-14 mmHg
Dietary sodium decreases	Reduce intake of dietary sodium not exceed than 100 mmol/d (2.4 g sodium or 6 g NaCl).	2-8 mmHg
Body activity	Engage in activities such as walking brisk (minimal 30 min per day, almost all the days of the week).	4-9 mmHg
Limited alcohol consumption	Limited intake of alcohol and not more than two drinks/day, and not to exceed then that.	2-4 mm Hg

2. Materials and Methods:

A prospective observational study was carried out for a period of six months in the IPD and OPD in

a tertiary care hospital, All the age ≥ 20 (20-70 age) years with or without comorbidities, including male and female patients, who were diagnosed with hypertension as per JNC 8, ESH/ESC, NICE, STG, Indian hypertension guidelines, WHO good prescribing guidelines and receiving antihypertensive drugs, were included according to guideline. Patient’s data relevant to the study was obtained from the patients clinical records. Data was collected from prescriptions and analyzed. 202 cases of patients undergoing antihypertensive treatments were encountered.

2.1 Study design: Hospital Based Observational Study.

2.2 Study site: TMMC and Research Centre, Moradabad

2.3 U.P. inclusion criteria: Age under (20-70) years, Sex (Male & Female).

2.4 Exclusion criteria:

- A hypertensive patient who was admitted to ICU.
- Patient on oral contraceptive pills.
- Pediatric population.

3. Observations and Results:

During this study, we enrolled 202 patients who were prescribed with antihypertensive drugs.

3.1 Age and gender group distribution of patients:

Antihypertensive drugs were administered based on age and gender (Table 2). 202 antihypertensive patients were observed by regularly monitoring in the hospital, we found that male patients were 54.45% and females were 45.55%. Indicating that hypertension was slightly more prevalent in males in comparison to females.

Table 2: Age group distribution of patients

Age group distribution of patients					
Gender	20-30	31-40	41-50	51-60	61-70
Male	28.5 7%	46.6 6%	44.45 %	59.0 9%	60%
Female	71.4 2%	53.3 3%	55.55 %	40.9 1%	40%

3.2 Comorbidities of the patients:

Out of 202, 83.66% of hypertensive patients were found to have other co-morbid conditions. Among the total of 202 patients, most were found ailed with that diabetes mellitus 27.72% followed by cardiovascular 16.33%, COPD 10.89%, with a comorbidities 10.89% and kidney disease 3.46% and other in which patients with only HTN, 16.33% patients were mostly influenced by hypertension not with other comorbidities.

Table 3: Comorbidities of the Patients

Comorbidities of the patient	Comorbidities of the Patients	
	Number of Patient	Percentage (%)
Diabetes Mellitus	56	27.72%
Heart disease	33	16.33%
COPD	22	10.89%
CAD with COPD	5	2.47%
Diabetes Mellitus with CAD	9	4.45%
CKD	7	3.46 %
Diabetes Mellitus with CKD	5	2.47%
CAD with CKD	4	1.98%

Diabetes Mellitus with COPD	5	2.47%
COPD with CKD	1	0.49%
Other	22	10.89%

Table 4: Patient with only HTN and Hypertension with other Comorbidities

Patient with only HTN and Hypertension with other Comorbidities		
Disease	Number of Patient	Percentage
Patient with only HTN	33	16.33%
Hypertension with other disease commodities	169	83.66%

According to JNC-8 Guidelines, Patients who achieved Prescription Adherence, were hypertension with Diabetes Mellitus (94.64%), Heart disease (93.93%), COPD (95.45%), CKD (85.57%) and other disease (95.45%). As per NICE Guidelines, Patients who achieved Prescription Adherence, hypertension with Diabetes Mellitus (75%), Heart disease (63.63%), COPD (72.72%), CKD (42.85%) and other disease (72.72%) in which hypertensives with CKD, mostly patients had not achieved good prescribing as per NICE. Prescription Adherence to ESH/ESC Guidelines, those who achieved prescription Adherence, hypertension with Diabetes Mellitus (82.14%), Heart disease (96.96%), COPD (77.27%), CKD (71.42%) and other disease (86.36%), mostly patients had achieved good prescribing as per ESH/ESC Guidelines in IHG and STG Guidelines, mostly patients had not achieved good prescribing which needed to improve Indian patients and physicians should followed IHG and

STG Guidelines.

3.3 Number of Drugs Prescribed:

Considering out of the total 202 patients, 154 (76%) received monotherapy while the remaining were put on multidrug regimen. 48 (24%) mainly on 2/3 drug regimen.

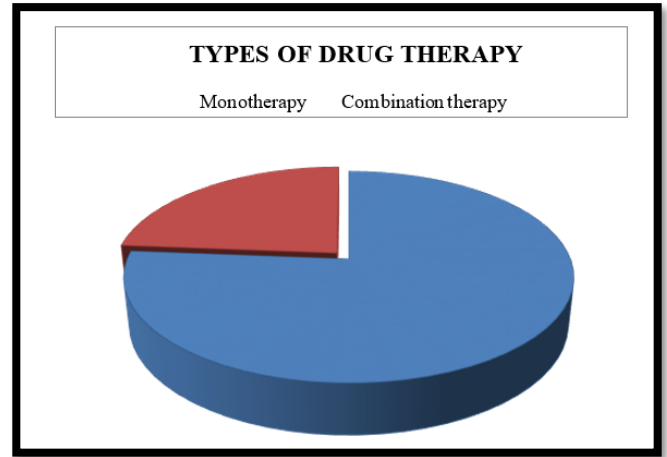


Figure 1: Types of drug Prescribed (Monotherapy and Combination therapy)

Among individual drugs monotherapy, amlodipine (22.89%), diuretics (furosemide, torsemide, hydrochlorothiazide, spironolactone, and chlorthalidone 19.58%) ARB (telmisartan 19.28%), bb (metoprolol, propranolol, 12.08%) and ACEI (5.72%) were the most utilized in all cases encountered. Others were on combination therapy, ARB+CCB (8.44%), ARB+D (2.71%), CCB+BB (1.20%), and CCB+D (0.60%), were most widely used in patients with diabetes, heart disease, and other disease with hypertension. Mostly patients were treated by monotherapy with disease of DM, Heart disease, CKD and other in which few patients were treated by combination therapy with diseases DM, CKD and heart ailments. In this study, patient with angina and COPD treated by beta blockers were not as per Guidelines. So as good prescribing practice, physicians must follow guidelines to improve patient’s quality of life.

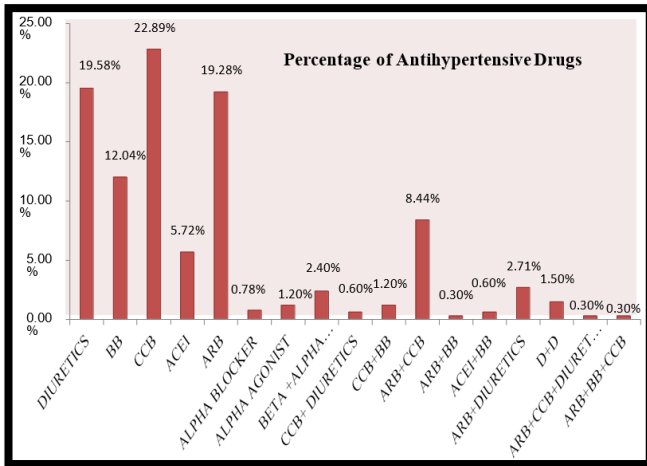


Figure 2: Percentage of Antihypertensive Drug used in Patients

Among individual drugs monotherapy, amlodipine (22.89%), diuretics (furosemide, torsamide, hydrochlorthaizize, spirinolactone, and chlorthalidone 19.58%) ARB (telmisartan 19.28%), bb (metoprolol, propranolol, 12.08%) and ACEI (5.72%) were the most utilized in all cases encountered. Others were on combination therapy, ARB+CCB (8.44%), ARB+D (2.71%), CCB+BB (1.20%), and CCB+D (0.60%), were most widely used in patients with diabetes, heart disease, and other disease with hypertension. Mostly patients were treated by monotherapy with disease of DM, Heart disease, CKD and other in which few patients were treated by combination therapy with diseases DM, CKD and heart ailments. In this study, patient with angina and COPD treated by beta blockers were not as per Guidelines. So as good prescribing practice, physicians must follow guidelines to improve patient’s quality of life.

Table 5: Overall utilization patterns of different drug classes

DIURETICS	CCB+DIURETICS	ARB+CCB+DIUR	19.58%	0.60%	0.30%
BB	CCB+BB	ARB+BB+CCB	12.04%	1.20%	0.30%
CCB	ARB+CCB		22.89%	8.44%	
ACEI	ARB+BB		5.72%	0.30%	
ARB	ACEI+BB		19.28%	0.60%	
ALPHA BLOCKER					
ALPHA AGONIST					
BETA+ALPHA...					
CCB+DIURETICS					
CCB+BB					
ARB+CCB					
ARB+BB					
ARB+DIURETICS					
ACEI+BB					
D+D					
ARB+CCB+DIURET...					
ARB+BB+CCB					
ARB+DIURETICS			0.78%	2.71%	
ALPHA AGONIST	D+D		1.20%	1.50%	
BETA+ALPHA...			2.40%		

Overall utilization patterns of different drug classes					
Class of drug Monotherapy	Class of drug Combination therapy	Triple therapy	% of total cases		
			Mon	Comb	Triple

As per national list essential medicine (2015) Compliance, the monotherapy was used in 82.67% and combination in 13.86% with two drugs which was included in NLEM. In the cases of combination of drug therapy, one was in NLEM but second drug which was not in NLEM (8.91%) and included in hypertensive treatment.

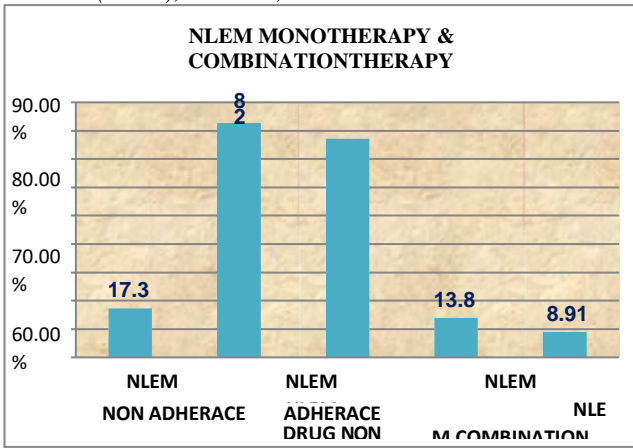


Figure 3: The National List of Essential Medicine (2015) Compliance

NFI (2011) compliance with mono therapy (16.84%) was included in this study and combination therapy with included drugs constituted (13.89%), in other one drug was included in NFI and other with combination was not included (8.19%).

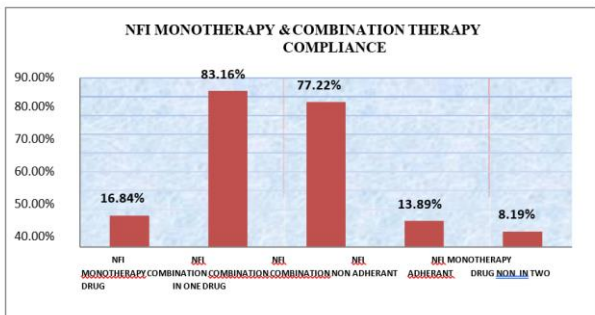


Figure 4: NFI (2011) Compliance

3.4 Overall prescription adherence to JNC-8, ESH/ESC, NICE, STG, Indian Hypertension Guidelines, WHO good prescribing Guidelines: A CKD were 115 patient and with diabetes & CKD (87). 95% of total patient JNC did follow and 5% not. In JNC 8, 95% achieved and 5% patients did not achieve the goal. In JNC 8 Guidelines, in patient with diabetes achieved goal at 94.64%, heart disease 93.93%, COPD 95.45%, Diabetes Mellitus with CAD 88.88% and other co morbidities 95.45% will reduce risk of prevalence

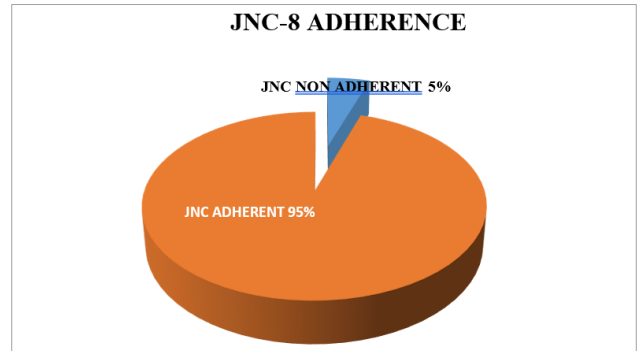


Figure 5: JNC-8 Adherence

3.5 NICE: 72% followed and 28% did not follow the NICE guidelines. 72% patients achieved the goal while 28% patients did not. In ESC/ESH total 84% followed and 16% did not follow. According to NICE Guidelines, therapy goal achieved in Diabetes Mellitus were 75%, heart disease 63.63%, COPD 72.72%, Diabetes Mellitus with CAD 100% & with other co morbidities 72.72%.

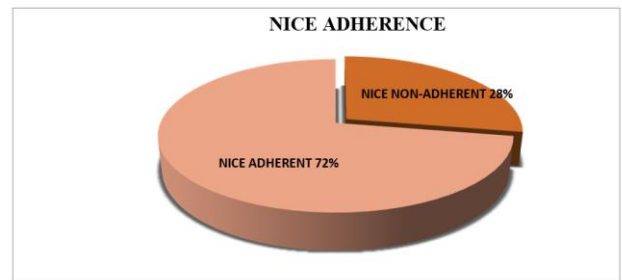


Figure 6: NICE Adherence

3.6 In ESC/ESH, 84% of patients achieved the goal. 16% patients did not. According to ESC/ESH guidelines, therapy goal achieved were in Diabetes Mellitus 82.14%, heart disease 96.96%, COPD 77.27%, Diabetes Mellitus with CAD 77.77% & with other comorbidities 86.36%.

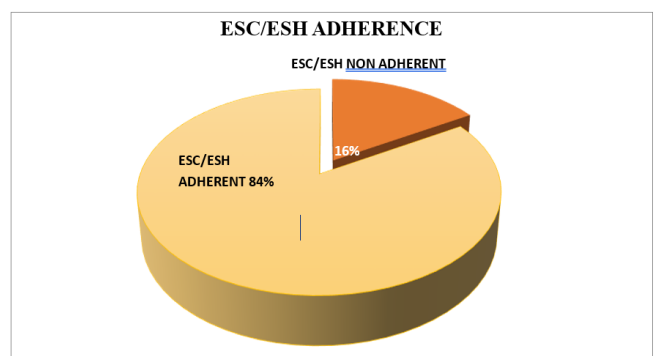


Figure 7: ESC/ESH Adherence

In IHG and STG, 70% of patients were IHG adherent and 30% were non-adherent 53.47% followed STG and 46.53% did not. In IHG and STG, 70% and 53.47% patients achieved respectively the goal but 30% & 46.53% patients respectively did not achieve. According to IHG guidelines, therapy goal achieved were in Diabetes Mellitus 75%, heart disease 69.59%, COPD 63.63%, Diabetes Mellitus with CAD 55.55% & with other co morbidities 59.09%. According to STG guidelines, therapy goal achieved were in Diabetes Mellitus 64.28%, heart disease 45.45%, COPD 31.31%, Diabetes Mellitus with CAD 45.45% & with other comorbidities 45.45%.

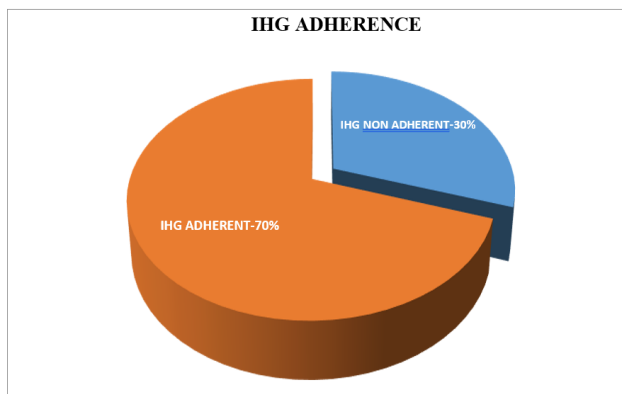


Figure 8: IHG Adherence

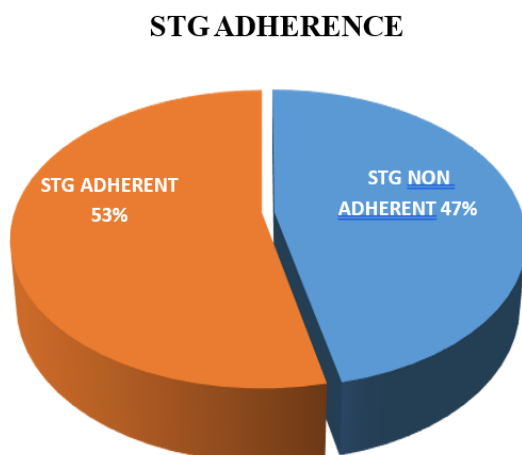


Figure 9: STG Adherence

4. Discussion:

The results of our study included a total number of hypertensive patients was 202, male were 54.45% and females 45.55% of the total population, indicating that hypertension was slightly more prevalent in males in comparison to females.

In this study we found that the hypertension was more prevalent in younger patients belonging to age groups 20-30 or more and most of this class of drugs frequently prescribed were calcium channel blocker alone or in combination. In this age group, the females were found in more crucial risk of hypertension than male. Considering out of the total 202 patients, 154 (76%) patients received monotherapy while the remaining were on multidrug regimen. 48 (24%) were on 2 drug therapy/3 drug regime. Among it individual drugs monotherapy, class of the various hypertensives prescribed were amlodipine (22.89%), followed by diuretics (19.58%), ARB's (19.28%) and BB (12.08%), ACEI (5.72%) respectively. In the multiple drug therapy and ARB+CCB (8.44%), ARB+D (2.71%), CCB+BB (1.20%), CCB+D (0.60%), respectively were most widely used in patients with diabetes, heart disease, and other disease with hypertension.

Therapeutic regime was analysed as per the JNC-8, ESH/ESC, NICE, STG, Indian hypertension guidelines, 202 patients were taken, without diabetes or CKD 115 and with diabetes & CKD 87. Out of 202 patients, we found that total 95% drugs prescribed according to JNC and 5% drug did not follow JNC guidelines. According to JNC 8, patients achieved 95% therapeutic goal by good prescribing practice by physicians while 5% did not. According to NICE guidelines, we found that 72% drugs were prescribed and 28% drugs not prescribed. In NICE guidelines, prescriber mentioned 28% beta blockers in patients which were not recommended and hence all patients failed to achieve the goal of therapy and rational use of drugs. Further 84% drugs were prescribed

and 16% were not prescribed according to ESC/ESH guidelines. Patients achieved 84% goal of drug therapy and 16% patients did not prescribed to achieve the goal because physicians did not followed 16% classes of drugs as triple combination and triple combination with spironolactone or other drugs. In IHG and STG, 70% were IHG adherent and 30% were non adherent, 53.47% followed STG and 46.53% did not follow. In IHG and STG, patients achieved 70% and 53.47% respectively. 30% patients did not achieve the goal because of IHG guidelines, prescriber prescribed 30% drugs like torsemide, nifedipine, clinidipine, moxonidine, propranolol and spironolactone in patients which were not recommended and all these patients failed to achieve the goal of drug therapy. According to STG guidelines, the adherence was 46.53%. The most co morbid condition among the cases was diabetes mellitus, COPD, CKD and Heart disease. Out of 202, 83.66% of hypertensive patients were found to have other co–morbid conditions. While most of patients were having diabetes mellitus followed by cardiovascular and kidney disease and others. Most commonly patients were having one being diabetes, heart disease, COPD followed by other disease.

5. Conclusion:

The study included that the hypertension most prevalent in males than in females, also it dependent upon various factors like physiological, environmental and genetic factors and further research was suggested as crucially needed to set up a pattern for the choice of medication or rationale. Calcium channel blockers (amlodipine) and diuretics (furosemide or torsemide), ARB (telmisartan) and ARB with CCB (amlodipine and telmisartan) were the choice of drugs for the treatment of hypertensive patients as a single drug and combination drug therapy. As per the JNC 8 (Fig. 5) & ESC/ESH guidelines (Fig. 7), majority of the therapeutic goals were achieved. Pattern of prescribing was fully consistent with to JNC 8 & ESC/ESH

guidelines; (on evaluation, detection, prevention and treatment of high blood pressure) for the treatment of HTN. Our results revealed that antihypertensive medication adherence to JNC 8 and an ESC/ESH guideline was optimal at the study site. Mostly patients were treated by monotherapy with disease of DM, heart disease, CKD and others in which few patients were treated by combination therapy with disease DM, CKD and heart ailments. In this study, patients with angina and COPD being treated with beta blockers were not as per guidelines (NICE & STG given in Fig. 6 & Fig. 9), I conclusively physicians should follow strict prescription pattern according to the therapeutic guidelines for better therapeutic and pharmaceutical care and to improve the patients quality of life and decrease the mortality rate.

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