

Drug utilization and evaluation of antihypertensive medications among patients with hypertension and type 2 diabetes mellitus in a tertiary care hospital, India

Utilización y evaluación de medicamentos antihipertensivos entre pacientes con hipertensión y diabetes mellitus tipo 2 en un hospital de atención terciaria, India

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Abstract

Objective: To find out drug utilization evaluation of antihypertensive medications among patients with hypertension and type 2 diabetes mellitus in a tertiary care hospital.

Methodology: This was a Prospective Observational study that was performed on 195 patients. The Source of data was collected from the patient's case sheets obtained from the record section. Ethical clearance was taken from the institutional ethical committee. Drugs data on the utilization of antihypertensive medications among patients with hypertension and type 2 diabetes mellitus and patient's data were computed using MS Excel and statistical analysis was done by using SPSS (Statistical Package for the social sciences).

Result: Our study shows that the majority 83(42.56%) of patients were of age group 51-60 years, 115 (58.97%) of patients belonging to male and 80 (41.02%) of patients female. Treatment was 101(51.79%) of patients with single anti-hypertensive drugs and 94 (48.20%) patients with combination therapy. Monotherapy shows that patients 29 (28.71%) were prescribed with CCB and very less number of patients 2 (1.98%) were prescribed with α blockers and most of the patients 23(24.46%) were prescribed with ARB, CCB and ARB + β - blockers.

Conclusion: a study on the assessment of prescribing patterns for hypertension confirmed that monotherapy was prescribed more than combination therapy. Specify with the guidelines, CCB was the most frequently prescribed drug class followed by ACE inhibitors, ARBs, diuretics, β -blockers, and α blockers. In combination therapy, ARB + CCB was mostly prescribed.

Keywords: Hypertension, Antihypertensive medication, Diabetes mellitus type2.

Resumen

Objetivo: Averiguar la evaluación de la utilización de medicamentos antihipertensivos entre los pacientes con hipertensión y diabetes mellitus tipo 2 en un hospital de atención terciaria.

Metodología: Se trata de un estudio observacional prospectivo que se realizó en 195 pacientes. La fuente de datos se recogió de las hojas de los casos de los pacientes obtenidas de la sección de registros. Se obtuvo la autorización ética del comité ético institucional. Los datos sobre la utilización de medicamentos antihipertensivos entre los pacientes con hipertensión y diabetes mellitus de tipo 2 y los datos de los pacientes se calcularon con MS Excel y el análisis estadístico se realizó con SPSS (Statistical Package for the social sciences).

Resultados: Nuestro estudio muestra que la mayoría 83 (42,56%) de los pacientes eran del grupo de edad de 51-60 años, 115 (58,97%) de los pacientes pertenecientes a los hombres y 80 (41,02%) de los pacientes mujeres. El tratamiento fue 101 (51,79%) de los pacientes con fármacos antihipertensivos únicos y 94 (48,20%) de los pacientes con terapia combinada. La monoterapia muestra que los pacientes 29 (28,71%) fueron prescritos con BCC y un número muy reducido de pacientes 2 (1,98%) fueron prescritos con α -bloqueantes y la mayoría de los pacientes 23 (24,46%) fueron prescritos con ARB, CCB y ARB + β -bloqueantes.

Conclusión: un estudio sobre la evaluación de las pautas de prescripción para la hipertensión confirmó que se prescribió más la monoterapia que el tratamiento combinado. De acuerdo con las directrices, los BCC fueron los fármacos más prescritos, seguidos de los IECA, los ARA, los diuréticos, los β -bloqueantes y los α -bloqueantes. En la terapia combinada, se prescribió mayoritariamente BRA + BCC.

Palabras clave: Hipertensión, Medicación antihipertensiva, Diabetes mellitus tipo 2.

Introduction

Diabetes mellitus and hypertension are interrelated diseases that strongly predispose an individual to atherosclerotic cardiovascular complications.¹ The incidence of hypertension in patients with type 2 diabetes mellitus is approximately two-fold higher than in age-matched subjects without the disease.² The prevalence of hypertension coexisting with diabetes appears to be increasing mainly in the aging population as both hypertension and non-insulin-dependent diabetes mellitus incidence increases with age.³ Hypertension has been recognized as a significant risk factor for the improvement of diabetes as well as for the advancement of miniature and macrovascular inconveniences, that is, neuropathy, nephropathy, retinopathy, coronary artery disease, stroke, peripheral vascular disease in diabetic patients.^{4,5}

Effective management and treatment for hypertension need proper screening and diagnosis. Treatment includes both non-pharmacologic (lifestyle changes, dietary changes) and pharmacological i.e., medication therapy to lower blood pressure and prevent cardiovascular events such as a heart attack, stroke. There are many classes of antihypertensives, which lower blood pressure by different means. Non-pharmacological interventions should be used throughout the management of all patients with high blood pressure.^{6,7}

The World Health Organization projected that 300 million people will suffer from diabetes and 1.5 billion⁸ from hypertension by 2025⁹. As per the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of individuals with diabetes in India as of now around 40.9 million, is relied upon to ascend to 69.9 million by 2025 except if urgent preventive advances are taken¹⁰. The incidence of hypertension in patients with T2DM is approximately two-fold higher than in age-coordinated with subjects without the disease¹¹.

Hypertension has been identified as a significant risk factor for the development of diabetes as well as for the development of miniature and macrovascular complications, that is, neuropathy, nephropathy, retinopathy, coronary supply route disease (CAD), stroke, fringe vascular disease (PVD) in diabetic patients. It has been obvious from Framingham heart study, UKPDS (the United Kingdom Prospective Study-39), Hypertension Optimal Treatment (HOT), Systolic Hypertension in the Elderly Program (SHEP), Systolic Hypertension in Europe (SYST-Eur), Hypertension in the Very Elderly Trial (HYVET-Pilot) that diminishing in either isolated systolic or systolic-diastolic hypertension fundamentally reduces the risk of miniature and macrovascular complications and cardiovascular (CV) death or diabetes-related death¹²⁻¹⁸. Lowering blood pressure (BP) in patients with diabetes mellitus is more cost-effective than tight blood glucose control,

and beneficial results are apparent earlier¹⁵. Therefore, all of the hypertension management guidelines, that is, Seventh Report of Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure-2003 (JNC-7), American diabetes association (ADA) 2010, European Society of Hypertension (ESH) [18], WHO guideline^{15,17,19} focused aggressively on blood pressure (BP) control in diabetic patient to below 130-135/80–85 mmHg^{15,16,19}.

Materials and methods

This was a Prospective and Observational study that was conducted for a period of six months from November 2017 to April 2018. A total of 195 patients from the department of cardiology and medicine, Apollo multispecialty hospital, and research center, those who have satisfied with the study criteria and consent to participate in this study were included for the study. All data were documented in data collection form and patients were followed up for any further addition of antihypertensive drugs. The blood pressure at the time of admission and during the hospital stay also was recorded. The antihypertensive drugs utilization pattern will be compared with international guideline JNC-8 to find out the extent of conformity with the guideline.

To interpret the outcome of the study, proper descriptive analysis has been carried out in this study. This model was Descriptive statistics, frequency and percentage were drawn and charts were used to represent the consolidated data for inferential statistics. Chi-square tests of independent of attribution were used to test the categorized data. The Statistical software namely SPSS 15.0, was used for the analysis of the data, and Microsoft Word and Excel have been used to generate graphs, tables, etc.

Result and discussion

Our study in **table I** represent that out of 195 patients, majority 83(42.56%) of patients were from the age group 51-60 years, followed by 59 (30.25%) of patients were from the age group 61-70, 15 (7.69%) of patients were from the age group 41- 50, 12 (6.15%) of patients were from the age group 71-80, 9 (4.61%) of patients were from the age group 31-40, 8(4.10%) of patients were from the age group 18-30, 6 (3.07%) of patients were from the age group 81-90, 3(1.53%) of patients were from the age group >90. This result is similar to Georgy M. Varghese, *et al.*²⁰ study on the drug utilization pattern of antihypertensive agents in a tertiary care hospital. We observed the majority of 83 (42.56%) of patients were from the age group 51-60 years. more precautions should be taken in this age group.

Table I: Age-wise distribution.

Age distribution	Number of patients	Percentage
18-30	8	4.10%
31-40	9	4.61%
41-50	15	7.69%
51-60	83	42.56%
61-70	59	30.25%
71-80	12	6.15%
81-90	6	3.07%
>90	3	1.53%
Totals	195	99.96%

The study of body mass index distribution in **table II**, shows that out of 195 patients, 120 (61.53%) patients were obese, and the remaining 75 (38.46%) patients were under normal weight. A patient who is obese must be recommended more about reducing of weight will be healthful to in reducing blood pressure. This result is similar to Vikas Pandey, et al.²¹ study on the evaluation of prescribing patterns in diabetic and hypertensive patients in a South Delhi Hospital.

Results on the vital parameter of patients in **table II**, show that out of 195 patients, 95 (48.71%) of patients were under stage 2 hypertension, followed by 60 (30.76%) of patients under stage 1 hypertension and the remaining 35 (17.94%) of patients were in prehypertension stage. This result is following JNC 8.

Table II: Demography of of the study patients.

Gender	Number of patients	Percentage
Male	115	58.97%
Female	80	41.02%
Totals	195	99.99%
BODY MASS (CATEGORY)		
Normal	75	38.46%
Obese	120	61.53%
Totals	195	99.99%
Socio-economic status		
Rural	75	38.46%
Urban	120	61.53%
Totals	195	99.99%
Social status		
Smoker	105	53.84%
Non smoker	90	46.15%
Totals	195	99.99%
Social status		
Alcoholic	101	51.79%
Non alcoholic	94	48.20%
Totals	195	99.99%
Diet pattern		
Under diet	73	37.43%
Without diet	122	62.56%
Totals	195	99.99%
Vital parameters		
Pre-hypertension 120-139 / 80-89	35	17.94%
Stage1 hypertension 130-139/ 80-89	60	30.76%
Stage2 hypertension =140mmHg/=90mmHg	95	48.71%
Totals	195	99.99%
Antihypertensive therapy		
Monotherapy	101	51.79%
Two drug combination	94	48.20%
Totals	195	99.99%

In the treatment of patients with the antihypertensive drug in **table II** represent among diabetic hypertensive patients, 101(51.79%) of patients were treated with single anti-hypertensive drugs, and 94 (48.20%) of patients were treated with antihypertensive drug combinations. This result was similar to Bipin b panda, et al.²² study on a survey of the prescription pattern of antihypertensive drugs in hypertensive and diabetic hypertensive patients. So in this study 101 (51.79%) of patients were treated with single antihypertensive drugs.

Study on monotherapy of hypertension in **table III** shows that, out of 101 patients who underwent monotherapy for the treatment of hypertension, 29 (28.71%) of patients were prescribed with CCBs, followed by 23 (22.77%) of patients with ACE inhibitors, 20 (19.95%) of the patients with ARBs, 18 (17.82 %) of the patients with diuretics, 11 (10.89%) of the patients with β -blockers and 2 (1.98%) of the patients with α blocker. In this study, most of the patients 29 (28.71%) were prescribed calcium channel blockers, and a very less number of patients 2 (1.98%) were prescribed α blockers. This result is similar to Georgy M. Varghese, et al.²⁰ studies on drug utilization pattern of antihypertensive agents in a tertiary care hospital on utilization pattern of antihypertensive drugs in Chinese diabetic we observed calcium channel blockers with 28.71% was the most prescribed drug among patients underwent monotherapy.

A study on combination therapy in **table IV**, reveals that out of 94 patients in whom two antihypertensives were prescribed, 23 (24.46%) patients were prescribed with a combination of ARB and CCB and followed by 21 (22.34%) of patients who were prescribed with ARB

Table III: Various antihypertensive drugs prescribed to hypertensive diabetic patients.

Class of drug	Name of the drug	Number of patients	Percentage
ACE Inhibitors	Ramipril	7	6.93%
	Enalapril	12	11.88%
	Lisinopri	4	3.96%
Totals		23	22.77%
ARBs	Losartan	5	4.95%
	Telmisartan	3	2.97%
	Olmesartan	2	1.98%
	Valsartan	10	9.90%
Totals		20	19.95%
β blockers	Atenolol	4	3.96%
	Metoprolol	5	4.95%
	Carvedilol	2	1.98%
Totals		11	10.89%
α blocker	Prazosin	2	1.98%
	Totals		2
CCB	Nifedipine	3	2.97%
	Amlodipine	24	26.73%
Totals		27	28.71%
Diuretics	Hydrochlorothiazid	10	9.90%
	Furosemide	8	7.92%
Totals		18	17.82
All Totals		101	99.99%

and Diuretics, 19 (20.21%) of patients were prescribed with Diuretics and ACE I, 10(10.63%) of patients were prescribed with CCB and ACE-I, 7 (7.44%) of patients were prescribed with calcium channel blockers and β -blockers, 5 (5.31%) of patients were prescribed with CCB and Diuretics, 4 (4.25%) of patients with BB and ACE I, 3 (3.19%) of patients were prescribed with ARB + β -blockers and 2 (2.12%) of patients were prescribed with β -blockers and diuretics. In this study, most of patients 23 (24.46%) were prescribed a combination of ARB and CCB, and ARB + β -blockers was the least combination therapy prescribed among 2 (2.12%) of patients. We observed that calcium channel blockers, angiotensin-converting enzyme inhibitors, and diuretics were the most prescribed combination therapy. To some extent, this part is following JNC 8 guidelines^{21,22}.

Other class of medication in **table V**, prescribed along with antihypertensive therapy shows that the most commonly prescribed category of drugs among these medications was analgesics (15.38%) followed by Muscle relaxants (11.79%) multivitamins (10.70%), Anti asthmatic and COPD (8.71%), Antiarrhythmic drugs (7.17%), Miscellaneous anti-inflammatory (6.15%), Laxatives (5.64%), Drugs for anxiety and sleep disorders (5.12%), anti-malarial (4.10%), Anti-anemic drugs and Antiulcer drugs (3.58%), Antibacterial drugs (3.07%), Corticosteroids and Anti rheumatoid agents (2.56%), Lipid regulating drugs (2.05%), Cytotoxic drugs,

Table IV: Antihypertensive drug therapy among hypertensive diabetic patients.

Two drug combinations	Number of patients	Percentage
ARB + D	21	22.34%
CCB + ACE-I	10	10.63%
CCB + BB	7	7.44%
ARB + CCB	23	24.46%
CCB + D	5	5.31%
ARB + BB	3	3.19%
BB + D	2	2.12%
BB + ACE I	4	4.25%
ACE I + D	19	20.21%
TOTALS	94	99.95%

Table V: Class of other medications.

Class	Number of patients	Percentage
Drugs for anxiety and sleep disorders	10	5.12%
Antiulcer drugs	7	3.58%
Laxatives	11	5.64%
Antiarrhythmic drugs	14	7.17%
Lipid regulating drugs	4	2.05%
Anti-anaemia drugs	7	3.58%
Multivitamins	21	10.70%
Anti-asthmatic and COPD	17	8.71%
Antidepressants	3	1.53%
Anti-allergies	2	1.02%
Antibacterial drugs	6	3.07%
Antimalarial drugs	8	4.10%
Anti-amoebic	1	0.51%
Corticosteroids	5	2.56%
Anticonvulsants	2	1.02%
Cytotoxic drugs	3	1.53%
Analgesics	30	15.38%
Anti-rheumatoid agents	5	2.56%
Miscellaneous anti-inflammatory	12	6.15%
Muscle relaxants	23	11.79%
Systemic antifungal	1	0.51%
Expectorants and cough syrups	3	1.53%
Totals	195	99.82%

Antidepressants Expectorants and cough syrups and (1.53%), Anticonvulsants and Anti allergies (1.02%), Anti amoebic and Systemic antifungal drugs (0.51%) Cytotoxic drugs and BCG vaccines (0.1%) respectively are the least prescribed. We observed that the analgesic group of drugs were the most prescribed drug with 15.38%. this result is similar to J.M. Okonta, *et. al*²³ study on prescribing Patterns of Antihypertensive and Antidiabetic Agents in a Secondary Healthcare Institution in Nigeria.

Conclusion

This was a prospective observational study, assessment of prescribing patterns in hypertensive patients with type 2 diabetes mellitus and it confirmed that out of 195 patients, the majority of patients were from the age group 51-60 years, six patients were from the age group 81-90, 3 patients were from the age group >90. Out of 195 patients, 115 patients belonging to males and 80 of patients belonging to a female. Out of 195 patients, Most of them were obese and only 75 patients were under normal weight. The number of patients who were smoker was more compared to the patients were a non-smoker. The number of alcoholic patients was higher than the number of non-alcoholic patients. The majority of patients are without diet and only around a third of the patients were under diet. Out of 195 patients, 95 patients were under stage 2 hypertension, followed by 60 patients under stage 1 hypertension, and the remaining patients were in the pre-hypertension stage. Approximately half of the patients were treated with single anti-hypertensive drugs and half of the patients were treated with antihypertensive drug combinations. Out of 101 patients who underwent monotherapy for the treatment of hypertension, most of them were prescribed calcium channel blockers, and a very less number of patients² were prescribed with α blockers. Out of 94 patients in whom two antihypertensives were prescribed, most of the patients were prescribed a combination of ARB and CCB, and ARB + β -blockers was the least combination therapy prescribed among patients. We observed that calcium channel blockers, angiotensin-converting enzyme inhibitors, and diuretics were the most prescribed combination therapy. The most commonly prescribed category of drugs among these medications was analgesics followed by Muscle relaxants multivitamins, Anti asthmatic and COPD, Antiarrhythmic drugs, Miscellaneous anti-inflammatory, Laxatives, Drugs for anxiety and sleep disorders, anti-malarial, Anti-anaemia drugs and Antiulcer drugs, Antibacterial drugs, Corticosteroids and Anti rheumatoid agents. Role of pharmacist Drug utilization and evaluation of antihypertensive medications among patients with type 2 diabetes mellitus.

Interests conflict

The authors declare no conflict of interest.

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