Prescription Pattern of Anti Hypertensive Drugs used in Hypertensive Patients with Associated Type2 Diabetes Mellitus in A Tertiary Care Hospital

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ABSTRACT
The study aims at the prescription pattern of Antihypertensive agents used in hypertensive patients who have associated Type 2 diabetes mellitus. The objective is to find whether the prescription pattern is in accordance with the Joint National Committee (JNC7) recommended Antihypertensive agents used in the treatment of hypertension with Type 2 diabetes mellitus. This is a prospective study conducted to establish the Antihypertensive drug prescription pattern in hypertensive patients with associated Type 2 Diabetes mellitus who were attending as outpatient in general medicine department at Sri Muthukumaran Medical College & Research Institute over a period of 3 months.

The study revealed most of the hypertensive patients with Type 2 diabetes mellitus received combination therapy (75.2%). Commonly prescribed combination therapy was Angiotensin Converting Enzymes inhibitors with Thiazide Diuretics (34.3%), Angiotensin Receptor Blockers with Thiazide Diuretic (26.5%), Angiotensin Converting Enzymes inhibitors with Calcium channel blockers (23.4%) and Angiotensin Receptor Blockers with Beta Blockers (9.3%), Angiotensin Converting Enzymes inhibitors with Thiazide diuretics and Beta Blockers (6.2%). The hypertensive patients with Type2 diabetes mellitus receiving monotherapy (24.7%) are comparatively lesser. Among the monotherapy category, Angiotensin Converting Enzyme Inhibitors (52.30%) are commonly prescribed class followed by Angiotensin Receptor Blockers (23.80%), Cardioselective Betablockers (9.50%), Calcium Channel Blockers(9.50%)and Diuretics (4.70%). The combination therapy is the most prescribed pattern than monotherapy. The prescription pattern was found to be in concordance with the Joint National Committee (JNC7) recommended treatment of hypertension with Type 2 Diabetes mellitus.

Keywords: Angiotensin converting enzyme inhibitors, angiotensin receptor blockers, antihypertensive agents, joint national committee (JNC7), type 2 diabetes mellitus

INTRODUCTION
Hypertension is the most important modifiable risk factor for coronary heart disease, stroke, congestive heart failure, and end-stage renal disease. In 2025 it is been estimated that 1.56 billion world population will suffer from hypertension [1]. Hypertensive Patients with diabetes have lower rates of blood pressure control and often require combination therapy. Approximately two-thirds of people with diabetes do not reach recommended target BP value of 130/80 mm Hg, a much higher proportion than patients without Diabetes mellitus. Blood pressure control is more important than tight blood glucose control at preventing cardiovascular events. The concordance of hypertension and diabetes is increased; hypertension is disproportionately higher in diabetics, while persons with elevated BP are two and a half times more likely to develop diabetes within 5 years [2]. The hypertension in diabetic...
patients has to be aggressively controlled to be around 130/80 mm Hg to prevent the diabetic nephropathy progressing to End stage renal disease [3]. Data from the recent United Kingdom Prospective Diabetes Study (UKPDS) hypertension study, demonstrated that aggressive lowering of diastolic blood pressure (BP) in diabetes to levels < 85 mm Hg and 80 mm Hg, were accompanied by a reduction of macrovascular events by one third and one half [5].

In India the overall prevalence of hypertension among elderly individuals are about 65%[4].So it is very essential to control the hypertension in Type 2 Diabetes mellitus patients to prevent microvascular and macro vascular complications [5]. Good blood pressure control, below 140 mmHg (systolic) and 90mmHg (diastolic) is achieved in only a minority of patients on anti-hypertensive mono therapy[6].Many studies proven that combination of two or more drugs are essential in effectively controlling hypertension in Type 2 Diabetes mellitus patients [6]. The Angiotensin converting enzyme inhibitors are considered main stay in the treatment of hypertensive patients with Type 2 Diabetes mellitus [9-11] with or without renal failure. The angiotensin receptor blockers [16]. Calcium channel blockers [12], Diuretics [12 14] and Cardio selective Beta blockers [15] also play vital role in the treatment of hypertension in Type 2 Diabetes patients.

The main objective of the study is to establish the antihypertensive agents utilized in the hypertensive patients with Type 2 Diabetes mellitus. This study aims at whether the drug utilization is in concordance with the seventh report of the Joint National Committee (JNC7) on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure.

**MATERIALS AND METHODS**

**Study Design:**
This was a prospective, observational drug utilization study conducted in hypertensive patients with associated Type 2 Diabetes mellitus in the general medicine department at Sri Muthukumaran Medical college Hospital and Research Institute, Chikarayapuram, Chennai. The study protocol was approved by the Institutional Ethical Committee. The total of 130 patients were screened and among them 85 patients met with the inclusion criteria. All patients in the study group were explained about the purpose of the study in their mother tongue and the consent was obtained.

**Inclusion and exclusion criteria:**
The hypertensive patients with type 2 Diabetes mellitus, both male and female patients aged between 30years – 65years attending out patients in general medicine Department were included. Type 2 Diabetes mellitus patients on any oral hypoglycemic agents and insulin with controlled blood sugar levels were included. Type 1 diabetes patients, patients aged less than 30 and more than 65 were excluded. Patients with blood sugar levels were excluded. The patients with renal complications, cardiac complications like congestive cardiac failure, ischemic heart failure were excluded. The inpatients were also excluded in this study.

**Sample size:**
The sample of 130 patients were screened and among them 85 patients (52 male and 33 female) who met with inclusion criteria were chosen in this study.

**RESULTS**
During the study period of three months from September 2013 to November 2013, 85 patients who met with inclusion criteria were selected. Out of 85 patients selected 52 were male (61%) and 33 were female (39%).

In this study it was found that male patients (Table 1) with hypertension associated with Type 2 Diabetes mellitus were more when compared with female patients in all age groups.

Among the age group, 51- 60 years group in both male and female patients has highest number of patients (31 %) when compared to other age groups.

The patients receiving combination antihypertensive agents (76.3%) were more than those receiving monotherapy (24.7%). The angiotensin converting enzyme inhibitors are the most commonly used drug both as a monotherapy and in combination therapy.
Table 1: Comparison of Demographic Parameters

<table>
<thead>
<tr>
<th>Demographic parameter</th>
<th>All (%)</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>85 (100%)</td>
<td>52 (61.1%)</td>
<td>33 (38.9%)</td>
</tr>
<tr>
<td>Age group (In years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>13 (15.2%)</td>
<td>07 (13.4%)</td>
<td>06 (18.1%)</td>
</tr>
<tr>
<td>41-50</td>
<td>22 (25.8%)</td>
<td>10 (19.2%)</td>
<td>12 (36.3%)</td>
</tr>
<tr>
<td>51-60</td>
<td>31 (36.4%)</td>
<td>22 (42.3%)</td>
<td>09 (27.2%)</td>
</tr>
<tr>
<td>61-65</td>
<td>19 (22.3%)</td>
<td>13 (25.0%)</td>
<td>06 (18.1%)</td>
</tr>
</tbody>
</table>

Table 2: Antihypertensive Agents used as Monotherapy in Number of Patients

<table>
<thead>
<tr>
<th>Antihypertensive agents</th>
<th>Monotherapy (21 patients)</th>
<th>Mono therapy (24.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiotensin converting enzyme inhibitors</td>
<td>11</td>
<td>52.3%</td>
</tr>
<tr>
<td>Angiotensin receptor blockers</td>
<td>5</td>
<td>23.8%</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>2</td>
<td>9.5%</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>2</td>
<td>9.5%</td>
</tr>
<tr>
<td>Thiazide diuretics</td>
<td>1</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

In patients receiving monotherapy (Table 2), Angiotensin Converting Enzymes Inhibitors (52.3%) were commonly prescribed class followed by Angiotensin Receptor Blockers (23.8%), Cardioselective Beta blockers (09.5%), Calcium Channel Blockers (09.5%) and Diuretics (04.7%) (Fig. 1).

Figure 1: Antihypertensive Agents used as Monotherapy in Percentage

In combination therapy (Table 3), Angiotensin converting enzymes inhibitors with Thiazide diuretics (34.3%) are the most commonly prescribed combination followed by Angiotensin receptor blockers with Thiazide diuretics (26.5%), Angiotensin receptor blockers with Beta blockers accounts for about 9.3% (Fig. 2). Angiotensin converting enzymes inhibitors with Calcium channel blockers were prescribed in 23.4% of the patients. The three drug regimen of Angiotensin converting enzyme inhibitor with Thiazide diuretic and Beta blockers were prescribed in 6.2% of the treatment population.

DISCUSSION

The present study represents the prescription pattern of the Antihypertensive drugs used in hypertensive patients with associated Type 2 Diabetes mellitus. The combination therapy is the most prescribed pattern than mono therapy. In this study the male patients were more than female patients which is different from other studies [17]. The Calcium Channel Blockers and Beta Blockers were
underutilized in a combination therapy it may be due to the fear of pedal edema and masking of hypoglycemic symptoms respectively. Thiazide diuretic as a mono therapy was rarely used, but in combination with Angiotensin converting enzyme inhibitors and Angiotensin receptor blockers it is widely used. The prescription pattern was found to be in concordance with the Joint National Committee (JNC7) recommended treatment of hypertension associated with Type 2 Diabetes mellitus patients, the usage of Angiotensin converting enzyme inhibitors and Angiotensin receptor blockers as a first line therapy [6]. The treating physicians were found to have given proper advice about the dosage, frequency of the prescribed drugs. The dietary advice also has been given on their first visit by the physicians. The pharmacist again emphasizes the timing and the frequency of the drugs.

CONCLUSION
This study revealed that most of the hypertensive patients with associated Type 2 Diabetes mellitus were given two or more drugs and among them Angiotensin Converting enzyme inhibitors and Angiotensin receptor blockers are the most commonly used agents. The prescription pattern was on concordance with the joint national committee 7 recommended therapy for hypertension associated with Diabetes mellitus.

ACKNOWLEDGEMENTS
The authors wish to acknowledge the support and cooperation of all the physicians and patients of Sri muthukumaran medical college and research institute who participated in the study. The authors also thank the pharmacists for their support during the course of this study.

<table>
<thead>
<tr>
<th>Antihypertensive agents</th>
<th>Combination therapy (64 patients)</th>
<th>Combination therapy (75.2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiotensin converting enzyme inhibitors + Thiazide diuretic</td>
<td>22</td>
<td>34.3%</td>
</tr>
<tr>
<td>Angiotensin receptor blockers+ Thiazide diuretic</td>
<td>17</td>
<td>26.5%</td>
</tr>
<tr>
<td>Angiotensin receptor blockers+ Beta blockers</td>
<td>06</td>
<td>9.3%</td>
</tr>
<tr>
<td>Angiotensin converting enzyme inhibitors +Calcium channel blockers</td>
<td>15</td>
<td>23.4%</td>
</tr>
<tr>
<td>Angiotensin converting enzyme inhibitors +Thiazide diuretics + Beta blockers</td>
<td>04</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

Figure 2: Antihypertensive Agents used as Combination Therapy in Percentage
REFERENCES