Analysis of Prescribing Patterns of Antihypertensive and Antidiabetic Medications in Patients

INTRODUCTION

Diabetes was first documented by the Egyptians and is characterized by weight loss and polyuria. However, it was the Greek physician Aertaeus who coined the term diabetes mellitus (DM). In Greek, diabetes means “to pass through” and mellitus is the Latin word for honey (referring to sweetness). Diabetes is an important cause of prolonged ill health and premature mortality, and claims more lives per year than HIV-AIDS with nearly one death every 10 seconds. With the advent of industrialization worldwide and the staggering rise in obesity, diabetes has manifested as a global epidemic. Although it is very difficult to reach an accurate measure of prevalence for two main reasons: the standard and methods of data collection varying widely in different parts of the world; recent surveys predict an increase in the prevalence of diabetes in adults from 4% in 1995 to 6.4% by the year 2025.1

Furthermore, it is estimated to change rapidly with a 42% increase from 51 to 72 million in the developed countries and a 170% increase from the 84 to 228 million in the developing world. Worldwide the number of adults suffering from diabetes will rise from 194 million in 2003 to nearly 380 million in 2025. The countries most affected by this epidemic in the year 2025 will be India, China and the USA.1

The second and fairly alarming reason is that even today there is a large population (almost 50%) of the patients remaining undiagnosed. The change in life expectancy and lack of improvement in healthcare are in part responsible for the astounding rise in the incidence of DM. As a result there is an upward trend of occurrence of diabetes, especially in the urban areas. Consequently, countries across the globe will face a significant increase in the burden for health care, as patients with diabetes are prone to both short-term and long-term complications and premature death.2

PATHOPHYSIOLOGY OF DIABETES

In the human body a number of systems and pathways function in synchrony to bring about and maintain a healthy physiological state. At the core of these processes lies the ability of the organism to maintain a
constant stable state or homeostasis. An aberration of the homeostasis leads to the development of an injury or a pathological state in various organs. DM reduces the ability of an individual to regulate the level of glucose in the blood stream resulting in a number of major and some minor complications.

Hypertension and diabetes are two of the leading risk factors for atherosclerosis and its complications, including heart attacks and strokes. There is substantial overlap between diabetes and hypertension, reflecting substantial overlap in their etiology and disease mechanisms. In the Hong Kong Cardiovascular Risk Factor Prevalence Study, only 42% of people with diabetes had normal blood pressure and only 56% of people with hypertension had normal glucose tolerance. In the US population, hypertension occurs in approximately 30% of patients with type 1 diabetes and in 50% to 80% of patients with type 2 diabetes. A prospective cohort study in the United States reported that type 2 diabetes mellitus was almost 2.5 times as likely to develop in subjects with hypertension as in subjects with normal blood pressure. In reality, diabetes and hypertension are found in the same individual more often than would occur by chance, whereas the overlap between dysglycaemia and raised blood pressure is even more substantial than that between diabetes and hypertension. This suggests either shared genetic or environmental factors in the etiology.

MATERIALS AND METHODS

A prospective study on 150 diabetic patients attending OPD/emergency/Indoor department of B.R.D Medical College and Nehru Chikitsalya, Gorakhpur, was done from May 2009 to October 2010.

A written Informed consent from all patients and Institutional Ethics Committee approval was obtained before starting the study.

A proper assessment of patients was done at presentation including treatment pattern of hypertension and for glycaemic control. All patients were examined clinically with funds examination and other routine clinical parameters like hemoglobin, GBP, blood sugar (fasting, post prandial), serum urea, serum creatinine, lipid profile, urine routine and microscopy, ECG, X-ray chest PA view.

Statistical analysis

First, identifying statistics were assigned to variables. Mean and standard deviations were calculated for time varying variables and percentages were calculated for categorical variables.

RESULTS

In present study out of 150 patients, 100 (66.67%) were males and 50 (33.33%) were females.

In present study, most of the patients [65(43.3%)] belong to age group of 50–60 years followed by 39(26%) patients in age group of 60–70 years. Mean age of presentation of male patients was 59.4 ± 10.7 years and that of female was 58.8 ± 9.35 years. Comparison of association between mean age of presentation and sex was statistically insignificant (p > 0.05).

Distribution of patients according to presence of hypertension showed that, out of total 150 patients, 85 (56.66%) males and 45(30%) females were hypertensive. Association between hypertension to sex was statistically insignificant (p > 0.05).

Distribution of patients according to duration of diagnosed hypertension showed that majority of patients had hypertension for 1 to 15 years and maximum number of patients had been hypertensive for less than 5 years. Mean duration of hypertension in male was 6.564 ± 6.27 years and that of female was 8.042 ± 6.17 years. Association between duration of hypertension to sex was statistically insignificant (p > 0.05).

The majority of patients had diabetes for 1 to 5 years. Mean duration of diabetes of male was 8.165 ± 7.62 years and that of female was 6.09 ± 5.33 years. Association between duration of diabetes to sex was statistically insignificant (p > 0.05). Forty-two (32.30%) patients were hypertensive who were having diabetes for a duration of 1–5 years followed by 30 (23.07%) patients who had diabetes for a duration of 5–10 years. Out of 150 patients, 130 (86.66%) patients were having both diabetes and hypertension.

Out of 130 patients who were diabetic and hypertensive, 44 (33.8%) had normal (18.5–22.99 kg/m²) BMI whereas 35 (26.92%) and 43 (30.7%) patients were overweight (23–24.99 kg/m²) and obese (25–29.99 kg/m²), respectively. Only 4 (3%) patients were with under weight or morbidly obese. Association between BMI and sex was statistically insignificant (p > 0.05).

In present study, out of 150 patients, 100 (66.66%) were having BMI <25 kg/m², out of them 82% were hypertensive and 50 (33.33%) patients had BMI of >25 kg/m², out of them 48 (96%) were hypertensive. Comparison of BMI to hypertension was statistically significant (p < 0.05).

In present study, most common complication was nephropathy in 101 (67.33%) followed by retinopathy in 80 (53.33%). Other common complications were neuropathy in 54 (36%), CAD in 49 (32.66) and stroke in 36 (24%) patients.

There was a significant relationship between duration of diabetes to chronic complications (p < 0.05). Out of 150 patients, 76 (50.66%) were having diabetes for more than 5 years, out of them 61 (80.2%) were having some diabetes-related complication.

In present study, the most common abnormality in lipid profile was deranged triglyceride level in 117 (78%), followed by deranged HDL cholesterol level in 95 (63.33%) patients and LDL cholesterol level in 67 (44.66%). Relationship between sex to lipid profile was found to be statistically insignificant (p > 0.05) (Table 1).
TABLE 1 Lipid parameters of study population.

<table>
<thead>
<tr>
<th>Lipid parameters</th>
<th>Male (n = 100)</th>
<th>Female (n = 50)</th>
<th>Z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>187.92 ± 42.68</td>
<td>182.27 ± 43.83</td>
<td>0.7508</td>
</tr>
<tr>
<td>LDL</td>
<td>212.29 ± 31.00</td>
<td>116.14 ± 33.20</td>
<td>0.9153</td>
</tr>
<tr>
<td>HDL</td>
<td>36.72 ± 7.82</td>
<td>44.18 ± 7.55</td>
<td>0.5633</td>
</tr>
<tr>
<td>TG</td>
<td>194.17 ± 55.46</td>
<td>188.2 ± 52.5</td>
<td>0.6441</td>
</tr>
</tbody>
</table>

TC: total cholesterol, LDL: low density lipoprotein, HDL: high density lipoprotein, TG: triglyceride.

Out of 126 patients, abnormal values of all lipid parameters were seen in 43 (34.12%) cases. This profile is characteristic of dyslipidemia found in diabetic patients. Isolated abnormalities of a single parameter with all other parameters in the normal range was (0.79%) for LDL, (7.93%) for HDL and (21.42%) for TG. A substantial number of patients (18.26%) had abnormal levels of only HDL and TG whereas LDL was normal.

Out of total 39 patients who were on lipid lowering therapy, only 27 (69.23%) males and 12 (30.76%) females were on lipid lowering drugs. The most common drug was various statin in both (77.7% males and 83.3% in females) groups.

Patients on lipid lowering drug had mean cholesterol, LDL cholesterol and HDL cholesterol within normal range, while the mean triglyceride level was deranged, irrespective of the drug used. We do not have the level of lipid profile before starting drugs, hence we cannot comment over effect of the drug used.

Frequency of various investigations carried out by care providing persons in diabetic patients showed that out of 150 patients only 12 (8%) were there who had lipid profile and fundus examinations. Majority of patients had never undergone any investigation as recommended.

Most common antihypertensive drug prescribed was calcium channel blockers in 71 (54%) patients. Other common drugs used were diuretics in 60 (46.15%), ARB in 39 (30%) and ACE inhibitors in 38 (29.23%) and beta blockers in 33 (25.38%).

Out of 130 hypertensive diabetics patients, 61 (46.92%) were hypertensive for more than 5 years, out of them 54 (88.52%) were on more than two drugs (p < 0.05).

Comparison of pattern of antihypertensive drugs to duration of hypertension showed that in patients with duration of hypertension >5 years, had increased prescription of atenolol (14.2%) followed by diuretics (48.2%), ACE inhibitors (30.3%) and ARB (30.3%).

In present study, the most common antidiabetic drug prescribed was sulphonylurea in 108 (72%). Other common drugs used were metformin Insulin (19.33%), alpha glucosidase inhibitors (14%) and sitagliptin (6.66%) were less often prescribed drugs.

Out of 150 patients, 125 (83.33%) were on medication, in them 74 (59.2%) were diabetic for more than 5 years. In these patients prescription of insulin (29.7%) and pioglitazone (43.2%) were increased followed by combination of metformin and pioglitazone.

Comparison of number of antidiabetic drugs to number of antihypertensive drugs showed that patients on more than two antidiabetic drugs were 108 (72%), out of them 76 (70.3%) were on more than two antihypertensive drugs.

DISCUSSION

A prescription-based survey is considered to be one of the most effective methods to assess and evaluate the prescribing attitude of the physicians and dispensing practice of pharmacists.

In the present study, the incidence of diabetes was seen in 100 (66.67%) male and 50 (33.33%) female patients. This was comparable with previous study by Guercil et al. where men and women were 53.7% and 46.3%, respectively.

The mean age of the patients in the present study was 59.4 ± 10.7 years which was comparable to previous studies where mean age was 60.9 ± 9.4 years and 58.3 ± 3.3 years.

Average duration of diabetes mellitus in the present study was 8.165 ± 7.62 years in male and 6.09 ± 5.33 years in female which was comparable with previous study where average duration was 7.69 years.

Amongst antidiabetic medications, sulphonylurea was the most commonly prescribed drug which was given in 108 (72%) patients followed by metformin in 64 (42.66%) and pioglitazone in 42 (28%) patients. In another study by Vengurlekar et al. where metformin was most commonly prescribed (27%) followed by glimepride (22.60%) and pioglitazone (13.9%).

In the present study it was observed that most commonly prescribed antihypertensive agents were Angiotensin Receptor Blockers and Angiotensin Converting Enzyme Inhibitors, which was comparable with a previous study by Elliott et al. The coexisting diseases were diabetes, coronary artery disease and hypothyroidism, and co-prescribed drugs were antidiabetics, statins and thyroid hormones. Since most prevalent coexisting disease was type 2 diabetes mellitus, the prescription of ARBs and ACE inhibitors seems justified as these drugs have a protective role in diabetic patients.

Previous reports from studies in both humans and animals have revealed that inhibitors of renin angiotensin system have reduced the incidence of new onset
Prescribing pattern of medications

Different studies have suggested that an ideal combination therapy must include antihypertensive drugs possessing complementary modes of action that possess synergistic antihypertensive effects without any adverse effects, at low doses. Furthermore, the antihypertensive drug combination therapy should be able to minimise or counteract the reflex compensatory mechanism that limit the fall in blood pressure. In the present study, two drug therapy was more commonly prescribed than three drug therapy which was comparable with other study. In the two drug combination, a beta blocker (Atenolol) with calcium channel blocker (Amlodipine) was most often prescribed which was comparable with the other study by Tiwari et al. In this form of combination and in addition to its favourable complementary synergistic effects, beta blockers tend to blunt the troublesome reflex tachycardia induced by dihydropyridine class of calcium channel blockers.

The present study had several limitations like, sample size in the present study was small and we might have focused only on the first prescription, this necessarily does not reflect the true clinical situation. We did not record the dose and dosing schedule of the treatment given. We also did not evaluate factors like treatment adherence, concerns of the patients about side effects and adherence to treatment guidelines while prescribing.

CONCLUSION
To conclude, most of the prescriptions were rational, but further improvement is needed. Further studies focused on rationale for choice of drug based on demographic data, economic status, associated conditions and complications would give additional insights into prescribing patterns in hypertension in India.

REFERENCES