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EVALUATION OF PRESCRIBING PATTERN OF ANTIHYPERTENSIVE DRUGS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

The prescribing pattern of antihypertensive drugs by different physicians is not in compliance with that of the standard guidelines given by WHO/JNC-7. If the patient factors associated with hypertension like age, sex, the presence or absence of co-morbid diseases are not taken into consideration while prescribing the drugs then the final BP control remains unsatisfactory. The purpose of this study was to evaluate the prescribing pattern, to determine the factors associated with the treatment of the disease. It is an observational, prospective, non-interventional study in which 400 prescriptions were collected during december-2010 to july-2011 in a tertiary care hospital. As monotherapy ACE-inhibitors (38.25%) were the most commonly prescribed antihypertensive followed by calcium channel blockers (19.25%), diuretics (13.25%). Among combination therapy oftenly 2 drug combinations were prescribed, the most common combination was ACE-inh + CCB (5%), followed by beta-blocker+CCB (3.5%). The main limitation of this study was that all the prescriptions were collected from inpatient from a single hospital and it may not be a representative of prescribing pattern across the city. In this study it was observed that the ACE-inhibitors are the most commonly prescribed monotherapy agents (38.25%) and their prescribing pattern was in consistent with the global trends. Thiazides and the combination drugs were underutilized in this study, despite robustic evidence to support their use had led to increased burden on the patients. Two drug combinations were oftenly prescribed rather than three or four drugs.

Key words: HTN Hypertension, ACE Angiotensin converting enzyme, CHF Congestive heart failure, DM Diabetes mellitus.

INTRODUCTION

A survey in Italian general practice hypertension control in primary care hospital was conducted by Filippi et al.[1] came out with an outcome that high risk cardiovascular patients/uncontrolled grade 2-3 hypertensive patients would probably require two additional drugs. The benefit of combination therapy over

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monotherapy as well as possible better efficacy of calcium channel blocker over diuretic inthe study population was demonstratedby Etuk et al.[2] More over in another study, it was revealed that unsatisfactory nature of the layout & information contained in the prescription is largely the result of the lack of standardization ofprescription formats in the country[3], where as in a meta-analysis the compliance with treatment guidelines for hypertension was studied & the results of this study enlighted the poor compliance with treatment guidelines by the physicians[4]. In the treatment of diabetic hypertensive patients ACE-inhibitors are more often prescribed drugs as per the guidelines[5], a disproportionately large percentage of antihypertensive drug cost was due to overt use of ACE inhibitors and indapamide instead of thiazide diuretics[6]. The compliance to the prescribing pattern by both family physicians and general practioners was suboptimal, educational programmes should specifically address these inadequencies in order to improve the quality of health care[7]. A review on evaluating the first line therapy with diuretics, betablockers, ACE-inhibitors, CCB, alpha blockers, centrally acting agents or angiotensin receptor antagonist was done and the Canadian recommendations for the management of hypertension was given[8]. Ramli et al.[9] conducted a similar trial in patients withhypertension, this study focusedthat poor adherence to antihypertensive medication has beenrecognized as a major reason for poor control of hypertension & it was revaled that simplifying the number of daily doses is effective in improving adherence. In constrast to the above trials the need of pharmacist interventions to improve the control of blood pressure in patients with hypertension has been illustrated by Glynn et al.[10] Life style modification adds an additional benefit in reducing the BP along with the antihypertensive drugs by the Canadian recommendations[11]. A study which was conducted in Germany by Jeschke et al.[12] has shown that the deviation from the guidelines were observed in one of every seven patients receiving some form of Complementary and Alternative Medicine (CAM) treatment. A similar study, which was conducted in United States came out with the conclusion that there is a continuous decline in the use of less expensive agents such as diuretics and beta blockers[13]. In another study the factors that are associated with antihypertensive drug compliance among Chinese patients were evaluated and it was concluded that Physicians should practice caution when prescribing antihypertensive drugs to patients with these factors where closer monitoring of their compliance patterns is warranted[14]. More over a study which was conducted by Pillay et al.[15] in South Africa has showed a substantial non-adherance to standard treatment guidelines. In the largest trial to date (ALLHAT), thiazide-type diuretic was found to offer advantages over newer drugs.

The medical community should now be capable of reaching consensus, and recommend thiazides as the first line therapy for the treatment of hypertension. Prescribing physicians, cardiologists, drug companies and health authorities are all partly responsible for the years of irrational prescribing that we have witnessed[16]. In a observational study, it was concluded that the present study represents the current prescribing trend for anti-hypertensive agents and it highlights certain shortcomings in the existing prescribing practice[17]. Young et al.[18] have found the patterns of angiotensin II-receptor blocker (ARB) therapy in patients with and without a history of antihypertensive use. They concluded that the patients who started antihypertensive therapy with ARBs tended to be new to antihypertensive therapy and, in a plurality of cases, continued to receive therapy with ARBs only. More than a fifth of patients who received antihypertensive therapy in the recent past were switched from that therapy to treatment with ARBs only[18]. In another observational study the prescribing patterns of antihypertensive therapies (AHT) before and after the publication of the LIFE, ALLHAT and VALUE trials between 2000 and 2005 was assessed, and concluded that their findings shown that there was little or no effect on any of the three clinical trials studied on new AHT prescribing patterns in Irish general practice[19]. Morris et al.[20] has determine the factors associated with blood pressure control and concluded that the age, sex, race and depression are associated with antihypertensive drug adherence and blood pressure control[20].

EXPERIMENTAL

Purpose of the study

The main purpose of this study was to further evaluate the prescribing pattern of antihypertensive drugs and to identify the factors affecting the implementation and use of the standard guidelines and to determine the type of drugs commonly prescribed i.e. either monotherapy or combination drugs.

Methodology

(1) **Number of Patients**: 400 Patient's Prescriptions.

(2) **Study Site**: The study will be conducted in the Department of Cardiology at Krishna Institute of Medical Sciences, Hyderabad.

(3) **Study duration:** 8 Months study.

(4) **Study design:** Observational, non interventional, prospective study.

Literature review

A preliminary literature survey was done in order to support the study proposed and this will be continued throughout the study period to update the knowledge about the current topic and other related topics.

(5) **Inclusion and exclusion criteria**

Inclusion criteria

- Patients with the age Group > 18 yrs.
- Hypertension with & without cardiovascular disease
- Hypertension with & without diabetes mellitus
- Patients receiving antihypertensive drugs with combinations.
- Alcoholic and non-alcoholic
- Smokers & nonsmokers**.**

Exclusion criteria

- Pregnant women.
- Patients with hepatic disease
- Age < 18 Years

RESULTS AND DISCUSSION

The maximum percentage of male and females with hypertension was found at the age group of 49-58 years, which is given in the Figs. 1 and 2. Among the total male patients there were 15.8% were alcoholic, 15% smokers and 28% were both alcoholic and smokers.

Table 1: Percentage of patients based on reason for admission

S. No.	Reason for admission	Number of patients	Percentage of patients
1.	Chest pain	129	32.25%
2.	Shortness of breath	77	19.25%
3.	Lower limb edema	63	15.75%
4.	Diabetes	45	11.25%
5.	Giddiness	32	8.00%
6.	Right abdominal pain	27	6.75%
7.	Diarrhea	27	6.75%

Table 2: Percentage of patients based on concomitant disease

S. No.	Concomitant disease	Number of patients	Percentage
1.	Coronary artery disease	67	41.35%
2.	Left ventricular dysfunction	26	16.04%
3.	Pulmonary edema	22	13.58%
4.	Cardiomyopathy	17	10.49%
5.	Giddiness	15	9.42%
6.	Hypertensive heart disease	13	8.02%

Table 3: Percentage of patients based on unrelated concomitant disease

S. No.	Unrelatedconcomitant disease	Number of patients	Percentage
1.	Type-2 Diabetes	76	31.9%
2.	Renal failure	42	17.6%
3.	Neurological disorders	34	14.2%
4.	Bronchial asthma	33	13.8%
5.	Cancer	13	5.4%
6.	COPD	10	4.2%
7.	Others	30	12.6%

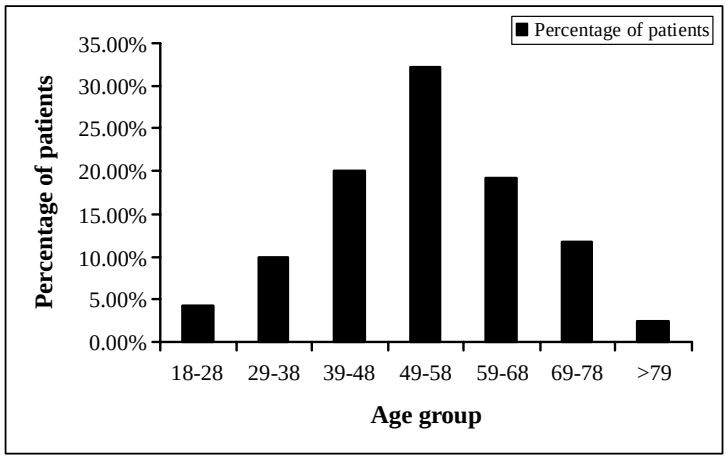

Fig. 1: Percentage distribution of males

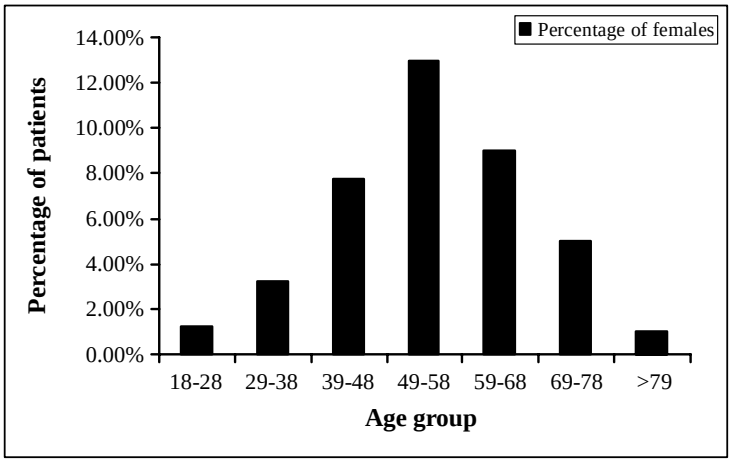

Fig. 2: Percentage distribution of females

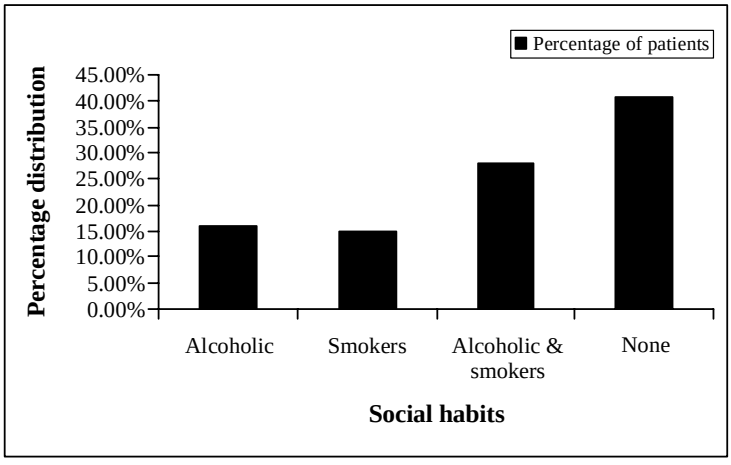

Fig. 3: Distribution of patients based on their social habits

As monotherapy ACE-inhibitors (38.25%) were the most commonly prescribed antihypertensive followed by calcium channel blockers (19.25%) and diuretics (13.25%) whose distribution in shown in Fig. 4 and Table 4. Among combination therapy oftenly 2 drug combinations were prescribed, the most common combination was ACE-inh + CCB (5%), followed by beta-blocker + CCB (3.5%) which shown in Fig. 5 and Table 5.

Table 4: Percentage of prescribed monotherapy antihypertensives

S. No.	Drug class	Number of prescriptions	Percentage
1.	ACE-Inhibitors	153	38.25%
2.	Calcium channel blockers	77	19.25%
3.	Loop-diuretics	53	13.25%
4.	Beta-blockers	27	6.75%
5.	Angiotensin-2 antagonist	27	6.75%
6.	Vasodilator	14	3.5%

Table 5: Percentage of combination drugs used for treatment

S. No.	Drug combinations	Number of prescriptions	Percentage
1.	ACE-Inhibitors + CCB	20	5%
2.	Beta-blockers + CCB	14	3.5%
3.	ACE + Loop diuretics	11	2.75%
4.	CCB + CCB	4	1%

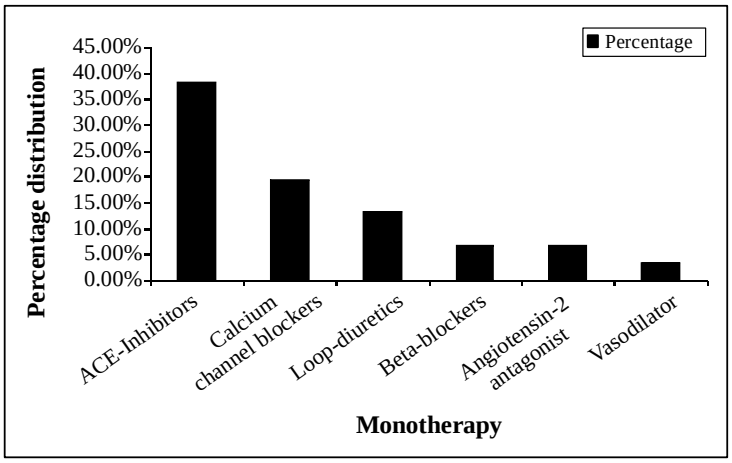

Fig. 4: Percentage distribution of monotherapy agents used for treatment

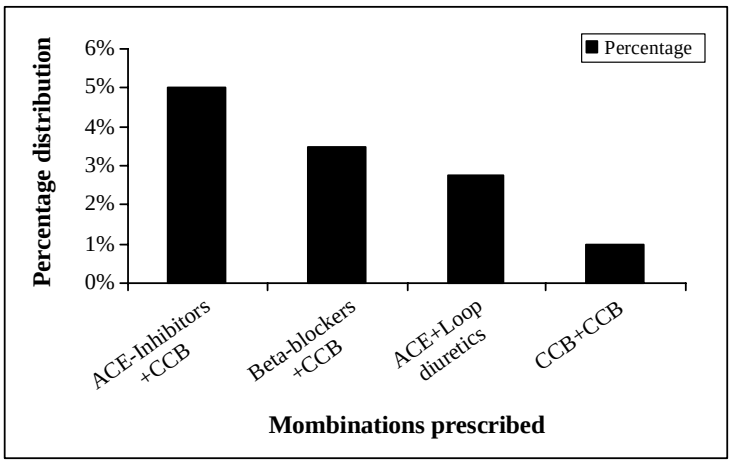

Fig. 5: Percentage distribution of combination drugs used for treatment

Principal findings

A total of 400 prescriptions were collected in which all the basic demographic data of the patient like blood pressure, sugar level (if the patient is diabetic), past medication history, social and family history was gathered. The following results were obtained in the study, out of 400 hypertensive patients prescriptions the percentage of males with hypertension was 59.75% (239 patients) whereas the percentage of females was 40.25% (161 patients).

In age and sex survival analysis, the highest percentage rate of hypertensive patients were found between the age range of 49-58 yrs (19.25% of males & 13% of females) which is followed by the age group of patients between 59-68 (10.25% of males & 9% of females), the least percentage rate of the patients were found between the age group of 18-28 (3% of males & 1.25% of females) followed by the age group of patients > 79 yrs.

As per the social habits of the patients were concerned, out of 239 males there were 38 alcoholic patients, 36 with smoking habit, 67 with both the habits of smoking and alcohol consumption, which is shown in the Fig. 3.

The distribution of patients according to the reason of admission, concomitant disease related to hypertension is given in the Table 6.

Table 6:

S. No.	Reason for admission	Concomitant disease	Percentage of hypertensive patients
1	Chest pain	Coronary artery disease	32.25%
2	Shortness of breath	Left ventricular dysfunction	19.25%
3	Lower limb edema	Congestive heart failure	15.75%
4	Diabetes	Endocrinal disease	11.25%
5	Right abdominal pain	Gastro intestinal disorder	8.00%
6	Diarrhea	Gastro intestinal disorder	6.75%
7	Others	Oncology, neurology	6.75%

From the above Table 6, it is clear that the maximum number of hypertensive patients were with cardiovascular disease associated with severe chest pain the figure was 129 (32.25%) out of 400 patients. It was followed by 19.25%, 15.75%, 11.25% with shortness of breath, lower limb edema, diabetes, respectively. The table also reveals that the least number of patients admitted to the hospital were with gastrointestinal disorder, asthma, cancer, urological, orthopedic problems.

Among the 400 patients, 351 patients received monotherapy and only 49 patients received a combination therapy. In patients receiving monotherapy the rate of prescription of antihypertensives was followed in the order of frequency by ACE-I (38.25%), calcium channel blockers (19.25%), Diuretics (13.25%) followed by beta-blockers, angiotensin-2 receptor antagonist with prescription rate of 6.75% of each.

ACE-Inhibitors constitute the most frequently prescribed antihypertensive drug class. Among all ACE-inhibitors ramipril was the most commonly prescribed especially in the department of cardiology, its prescription pattern was similar to worldwide trend. In the Heart Outcomes Prevention Evaluation (HOPE)

Study of 9297 patients, ramipril reduced, by 20-30%, the rates of death, myocardial infarction, and stroke in a broad range of high-risk patients, who were not known to have a low ejection fraction or heart failure. Moreover ACE-inhibitors are the most commonly prescribed antihypertensives for diabetic patients, which was also in accordance with the evidence and the guidelines as these drugs will reduce the chance of occurrence of diabetic nephropathy, retinopathy and other related complications.

When calcium channel blockers were concerned their percentage of prescription was 19.25%, among the calcium channel blockers the most commonly prescribed drugs were the dihydropyridine type of calcium channel blockers (ie., amlodipine, felodipine) whereas the prescription of non-dihydropyridine type of calcium channel blockers was very less.

In the case of diuretics the overall preference for prescribing the thiazides was negligible on the other hand there were 13.25% of prescriptions with loop-diuretics.

The percentage of prescription of angiotensin-2 receptor antagonist was 6.75% of which 90% of prescriptions were with the brand name Telma (telmisartan) which clearly indicates that telmisartan was the most commonly prescribed angiotensin-2 receptor antagonist by the physicians in the hospital.

The overall preference for prescribing beta-blockers was only 6.75% among all the prescriptions. As per the combination therapy was concerned only 12.25% of the patients received a combination drug therapy for the treatment of hypertension, all the patients who were on a combination therapy received only a 2-drug combination. The following are the 2-drug combinations that were prescribed.

(i) ACE-Inh+CCB

(ii) Beta-blocker+CCB

(iii) CCB+CCB

(iv) ACE-Inh+loop diuretics.

A 2-drug combination of CCB+ACE-Inhibitors were prescribed to a majority of patients 20 (5%), followed by a combination of Beta-blockers+CCB 14 (3.5%), ACE+Loop-diuretics 11 (1%), CCB+CCB 4 (1%).

CONCLUSION

In this study, it was observed that the physicians had preferred monotherapy more oftenly than the combinations and the most frequently prescribed agent among monotherapy was ACE-Inhibitor class of antihypertensive. ACE-Inhibitors are the only class of drugs that are often prescribed to diabetic hypertensive patients, as these drugs prevent the chance of occurrence of diabetic nephropathy, retinopathy and other related complications. Thiazide diuretics and the combination drugs were underutilized in this study, despite robust evidence to support their use. As the use of the thiazide diuretics as monotherapy was negligible it increases the burden on the patients. As per the combinations were concerned only two drug combinations were prescribed there were no three or four drug combination prescriptions observed.

Pharmacist can further improve the compliance by implementing the following methods :

(i) Simplify the drug regimen to once-daily, if possible.

(ii) Label prescriptions with clear, explicit directions and indicate the purpose of the drug.

(iii) Encourage the use of promoting stickers or calendars to remind patients.

(iv) Provide written schedules or pill box organizers for patients who are taking multiple drugs.

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REFERENCES

1. A. Filippi, I. Paolini, F. Innocenti, G. Mazzaglia, A. Battaggia and O. Bringnoli Blood Pressure Control and Drug Therapy in Patients with Diagnosed Hypertension J. Hum. Hypertens., **23**, 758-763 (2009).
2. E. Etuk, S. A. Isezuo, A. Chika, J. Akuche and M. Ali, Prescription Pattern of Anti-Hypertensive Drugs in a Tertiary Health Institution in Nigeria. Annals of African Medicine, **7(3)**, 128-132 (2008).
3. S. Sultana, K. Hamid, K. M. S. Islam and S. Roy, Assessment of Prescription Pattern of Hypertensive Patient's Prescription, Euro J. Pub., **40**, 500-505 (2010).
4. A. Windak, B. Gryglewska, T. Tomasik, K. Narkiewicz, Y. John and T. Grodzicki, Competence of Polish Primary-care Doctors in the Pharmacological Treatment of Hypertension, J. Eval. Clin. Pract., **16(1)**, 25-30 (2010).
5. Guidelines Committee European Society of Hypertension-European Society of Cardiology Guidelines for the Management of Arterial Hypertension Hypertens, **21**, 1011-1053 (2003).
6. K. A. Jassim Al Khaja, R. P. Sequeira, A. W. Wahab and V. S. Mathur, Antihypertensive Drug Prescription Trends at the Primary Health Care Centers at Bahrain Pharmacoepidemiol Drug Saf, **10(3)**, 219-227 (2001).
7. K. A. Al Khaja, R. P. Sequeira, V. S. Mathur and A. W. Abdul Wahab, Family Physicians and General Practitioners Approaches to Drug Management of Diabetic Hypertension in Primary Care J. Clin. Pharm. Ther., **26(1)** (2001).
8. N. A. Khan, F. A. Mc Alister, N. R. Campbell, R. D. Feldman, S. Rabkin and J. Mahon, the Canadian Recommendations for the Management of Hypertension, Can. J. Cardiol., **20(1), 41-54** (2004).
9. A. S. Ramli, M. Miskan, K. K. Ng, D. Ambigga, M. N. Nafiza, M. Y. Mazapuspavina, J. Sajari and R. Ishak, Prescribing of Antihypertensive Agents in Public Primary Care Clinics – Is it in Accordance with Current Evidence? Malaysian Family Physician, **5**, 36-40 (2010).
10. L. G. Glynn, A. W. Murphy, S. M. Smith, K. Schroeder, T. Fahey, Interventions used to Improve Control of Blood Pressure in Patients with Hypertension, Cochrane Database Syst. Rev., 17 3:CD005182 (2010).
11. N. R. Campbell, E. Burgess, B. C. Choi, G. Taylor, E. Wilson and J. Cleroux, Life Style Modifications to Prevent and Control Hypertension can Famphysician, **45**, 1640-1645 (1999).
12. E. Jeschke, T. Ostermann, H. C. Volmar, M. Kroz, A. Bockelbrink and C. M. Witt, Evaluation of Prescribing Patterns in a German Network of CAM Physicians for the Treatment of Patients with Hypertension BMC, Geriatrics, **10**, 78 (2010).
13. T. A. Manolio, J. A. Cutler, C. D. Furberg, B. M. Psaty, P. K. Whelton and W. B. Applegate, Trends in Pharmacologic Management of Hypertension in United States Arch. Int. Med. April 24 (1995).

14. M. C. S. Wong, J. Y. Jiang and S. M. Griffith Factors Associated with Antihypertensive Drug Compliance in Chinese Patients, J. Epidemiol. Community Health, **64**, 895-901 (2010).

15. T. Pillay, A. J. Smith and S. R. Hill, A Comparison of Two Methods for Measuring Anti-Hypertensive Drug use: Concordance of use with South African Standard Treatment Guidelines, Bull World Health Organ., **87(6)**, 466-471 (2009).

16. A. Fretheim, Back to Thiazide-Diuretics for Hypertension: Reflections after a Decade of Irrational Prescribing BMC Fam. Pract., Dec. 23, **4**, 19 (2003).

17. H. Tiwari, A. Kumar and S. K. Kulkarni, Prescription Monitoring of Anti-hypertensive Drug Utilisation at the Panjab University Health Centre in India, Singapore Med. J. Mar., **45(3)**, 117-120 (2004).

18. C. H. Young, K. Zhang and A. W. Poret, Patterns of Antihypertensive Therapy in New users of Angiotensin II-Receptor Blockers, Am J. Health Syst. Pharm. Nov., 15, **62(22)**, 2381-2385 (2005).

19. Z. Kabir, J. Feely and K. Bennett, Primary Care Prescribing Patterns in Ireland after the Publication of Large Hypertension Trials, Br J. Clin. Pharmacol. Sep., **64(3)**, 381-385 (2007).

20. A. B. Morris, J. Li, K. Kroenke, T. E. Bruner-England, J. M. Young and M. D. Murray, Factors Associated with Drug Adherence and Blood Pressure Control in Patients with Hypertension. Pharmacotherapy Apr., **26(4)**, 483-492 (2006).