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COST ANALYSIS OF ANTIHYPERTENSIVE DRUGS IN TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Hypertension is one of the major chronic diseases with high mortality and morbidity in today's world. The various reasons for hypertension are socio-economic, behavioral, sedentary life style, nutritional and poor health maintenance. The choice of antihypertensive differs, because of factors like short term and long term efficacy, side effects and cost. Study aimed to evaluate the cost analysis of antihypertensive prescription /drugs among rural population. The average treatment cost per month was calculated and compared with various classes of antihypertensive. During 9 months study period, 151 hypertensive patients prescription were collected including 96 (63.6%) male patients 36.42% female patients. Cost comparison of various treatments suggested in the fixed dose combinations are Hydrochlorothiazide (12.5 mg) and Losartan (50,100 mg) and Furosemide and Spiranolactone 19(24.1%) cost/day (2.74±0.29), cost/month (82.23±9.60) were most economical in two drug combinations. The result shows the better to use the combination therapy in hypertensive patients; this is one of the therapies which help the patient to lower the cost and minimum side effects. In our study we found that most of the hypertensive prescription contains monotherapy and also the therapy contains most cost effective drugs as compared to combination therapy.

INTRODUCTION

Chronic diseases are diseases of long duration and generally slow progression in nature. Chronic diseases, like cardiovascular diseases (HTN, angina, MI, arrhythmias, stroke), cancer, chronic respiratory diseases and diabetes, are the leading cause of mortality and morbidity in the world, representing 60% of all deaths. Rising of the body mass index is the one of the important cause of this chronic diseases.[1]

Chronic disease creates large adverse and underappreciated –economic effects on the families, community and countries. WHO projects that over next 10 years in India over 60 million people die from chronic diseases.[2]

Cardiovascular disease has emerged as an important health problem in India. The cardiovascular disease like hypertension must be controlled properly. Otherwise this leads to further cardiac diseases. Hypertension is one of the major chronic diseases with high mortality and morbidity in the today's world. Epidemiological studies demonstrate that prevalence of hypertension is increasing rapidly among Indian urban and rural populations.[3, 4]

The various reasons for hypertension are socio-economic, behavioral, sedentary life style, nutritional and poor health maintenance. The poor controlling of hypertension leads to further progression cardiovascular complications like ischemic heart disease, heart failure, stroke and chronic renal insufficiency.[3, 5]

Currently, primary care physicians can choose from numerous pharmacological agents to treat hypertension. The commonly used antihypertensive drug classes include diuretics, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, alpha-blockers, and calcium channel blockers. Selection of an evidence-based therapy with demonstrated efficacy, safety, and low cost has important economic implications. The roles of clinical pharmacists in cost management are,

- Encouraging prescribers to make cost effective choices of drugs when clinically appropriate
- Integrating improvements so that costs are actually saved not merely shifted
- Introducing system interventions that both save costs and enhance the quality of patient care
- Using data to identify compliance and noncompliance with prescribing guidelines, and, creating measures for assessing physician performance, identifying prescribing patterns, and determining opportunities for improvement.[6]

Adichunchanagiri Institute of Medical Sciences (AIMS) is a 750-bedded tertiary care teaching hospital situated in a rural area of B.G.Nagara of Nagamangala taluk. There were no studies conducted previously in this rural hospital regarding the cost analysis of antihypertensive. So this study could provide valuable information regarding pattern of drug usage in this common chronic disease and reveal opportunity for invention in improving/promotion of rational drug use. With this aim the present study is taken to know the cost effectiveness of antihypertensive drugs in rural hospital setup.

METHODOLOGY

Study Site:

The study was conducted in medicine unit of Adichunchanagiri Medical College Hospital and Research Center, B.G.Nagara. This is a tertiary care teaching hospital (750 bed hospital) with multi specialties like medical, cardiology, surgery, pediatrics, psychiatry, radiology and urology.

Study Design:

The study was a prospective, observational study.

Sample Size:

A total of 151 patients from the Medicine and Cardiology departments (i.e. out patients and inpatients) were taken in this study.

Study Period:

The study was conducted over a period of nine months i.e. from June 2010 to February 2011.

Ethical Approval

Ethical committee clearance /approval were obtained from the Institutional Ethical Committee of Adichunchangiri Institute of Medical Science.

Study Criteria: Inclusive Criteria:

Patients having > 18 years of age with hypertension. Patients had a history of hypertension or recently diagnosed.

Exclusion Criteria:

Patients below the age of 18 years

Patients who are not willing to give the consent

Source of Data

The Patient's demographic details, clinical findings, laboratory and therapeutic data were collected from the following source.

- Patient's case notes/ direct interviewing of the patient.
- Treatment chart /Medication chart
- Lab data reports.
- Patient Discharge cards

Study procedure

1. Patient Enrollment

Almost 151 patients who met the study criteria and signed the informed consent were enrolled to the study for assessing prescription pattern. WHO based prescription auditing pro-forma was used for data collection, which included medication information (name, dose, frequency, route etc.) and patient information details (name, age, and sex), socioeconomic parameters, past medical history, disease diagnosed and duration of treatment. The antihypertensive medications used in the hypertensive patients of general medicine and cardiac department were recorded. All the patients who visited the medicine outpatient department as well as the inpatients in the medicine department wards were reviewed daily to identify the patients who were diagnosed / screened as hypertensive. The hypertensive patients who met the study criteria were enrolled into the study. All the other necessary details such as demographics, medication prescribed etc were also documented in a data collection.

2. Average Monthly Cost of Treatment

The cost of the antihypertensive medication (Single and Combination therapy) prescribed was analyzed by calculating the average cost of the medicine(s) per month. The average treatment cost per month was calculated and compared with various classes of antihypertensive agents against the goal blood pressure achieved in the particular stage of hypertensive patients. The medicine(s) whose monthly cost was lower with a greater control in blood pressure was considered to be cost effective for the patient.

RESULTS

Table 1: Gender wise distribution of hypertensive patients

Gender	Number of patients	%
Male	96	63.6
Female	55	36.4
Total	151	100.0

Table 1 shows that out of 151 hypertensive patients' males were 96 (63.6%) and females were 55 (36.4%).

Table 2: Age wise distribution of hypertensive patients

Age in years	Number of patients	%
<30	2	**1.3**
31-40	9	**6.0**
41-50	17	**11.3**
51-60	40	**26.5**
61-70	50	**33.1**
71-80	27	**17.9**
81-90	5	**3.3**
>90	1	**0.7**
Total	**151**	**100.0**

Mean ± SD (standard deviation): 62.42±12.74

Table 2 showed that out of 151 patient, the age between 61-70 years of age having more number of patients,i,e 50(33.1%) in hypertensive's, and 2 (1.3%) patients were from the age group <30, and one (0.7%) patient was from age group of >90 years of age less number of patients in hypertension. Age group of 61-70 years old patients were mostly affected by cardiovascular disorders like hypertension.

Table 3: Distribution of drugs therapy usage pattern.

Drug therapy	**Male (n=96)**		**Female (n=55)**		**Total (n=151)**	
	N	**%**	**N**	**%**	**N**	%
Mono therapy	56	64.4	27	32.53	83	**54.9**
Combination therapy	40	58.82	28	41.17	68	**45.1**
Inference	**Incidence of monotherapy or combination therapy is statistically similar between male and female with p=0.309**					

Table 3 showed the details of patients, who treated with monotherapy and combination therapy. Among these, the monotherapy 56(58.3%) were in male hypertensive patients and 27(49.1%) were in female hypertensive patients. In combination therapy 40(41.7%) were male hypertensive patients and 28(58.9%) were female hypertensive patients.

Table 4: Monthly Cost analysis for combination drugs

DRUG COMBINATION	**Number**		**COST(Rs)**	
	Number of prescription	**%**	**COST PER DAY**	**COST PER MONTH**
1. AMLODIPINE+ATENOLOL	9	11.4	3.10±1.19	**134.38±93.79**
2.AMLODIPINE+HYDROCHLOR THIAZIDE	3	3.8	2.76±1.54	**81.90±45.21**
3.ASPIRIN+ATORVASTASTIN	1	1.3	-	**-**
4.CLOPIDOGREL+ASPIRIN	13	16.5	2.91±0.05	**87.18±1.50**
5.ENALAPRIL+HYDROCHLORTHIAZIDE	6	7.6	2.50±0.00	**150.00±82.16**
6.FRUSEMIDE+AMILORIDE	7	8.9	0.79±0.41	**23.79±12.44**
7.FUROSEMIDE+SPIRANOLACTONE	19	24.1	2.74±0.29	**82.23±9.60**
8.LOSARTAN+AMLODEPINE	2	2.5	2.50±0.00	**64.00±0.00**
9.LOSARTAN+HYDROCLORTHIAZIDE	15	18.9	6.38±0.00	**204.16±49.42**
10.RAMIPRIL+HYDROCHLORTHIAZIDE	2	2.5	6.60±0.00	**198.00±0.00**
11.TELMISARTAN+AMLODEPINE	1	1.3	-	**-**
12.TELMISARTAN+HYDROCHLORTHIAZIDE	1	1.3	8.70±0.00	**261.00±0.00**
ALL COMBINATIONS	**79**	**100.0**	**3.51±1.88**	118.43±73.37
SIGNIFICANCE	**-**	**-**	**F=96.875; p<0.001****	**F=13.085; p<0.001****

Table 5: Monthly Cost analysis for Single drug therapy

Single drug	Number		Cost(Rs)	
	Number of prescription	%	COST PER DAY	COST PER MONTH
1. AMLODIPINE	41	18.0	3.51±0.38	105.37±11.33
2. ASPIRIN	17	7.5	0.49±0.33	14.70±9.81
3. ATENOLOL	5	2.2	2.16±0.49	65.99±15.85
4. ATORVASTATIN	19	8.3	10.30±3.51	229.01±174.44
5. CARVEDELOL	6	2.6	2.57±0.72	77.00±21.52
6. CLOPIDOGREL	9	3.9	5.97±0.84	179.00±25.5

7. ENALAPRIL	21	9.2	2.84±0.48	85.09±14.91
8. FRUSEMIDE	39	17.1	3.00±0.00	90.51±0.22
9. FURESOMIDE	7	3.1	3.00±0.00	90.00±0.00
10. ISORBATE DI NITRATE	8	3.5	0.71±0.12	25.65±25.50
11. LOSARTAN	9	3.9	5.20±0.91	152.07±34.39
12. METOPROLOL	4	1.8	4.53±2.60	135.90±77.91
13. NEPHEDEPINE	2	0.9	0.60±0.00	18.00±0.00
14. PROZOCIN	10	4.4	7.63±0.10	277.98±102.56
15. RAMIPRIL	20	8.8	6.29±1.33	187.71±42.00
16. SPIRANOLACTONE	9	3.9	4.45±2.59	126.13±86.16
17. TELMISARTAN	1	0.4	4.00±0.00	120.00±0.00
18. TORSEMIDE	1	0.4	2.77±0.00	81.00±0.00
ALL drugs	228	100.0	4.15±2.84	116.16±84.84
SIGNIFICANCE	-	-	F=50.833; p<0.001**	F=14.171; p<0.001**

Table 4 & 5 show that the cost of single drugs and combination drugs, in single drug cost, total 228 drugs were prescribed among this Amlodipine drugs 41(18.0%) were found to be more cost effective than their total cost of individual components or drugs. In combination drugs cost, total 79 drugs were prescribed among this Losartan+HTZ 15(18.9%),Furosamide with Spiranolactone 9(24.1%), Amlodipine+Atenolol 9(11.4%) were found to be more cost effective. The total mean cost per day and cost per month for single drugs were (4.15±2.84), (116.16±84.84), and the total mean cost per day and cost per month for combination drugs were (3.51±1.88), (118.43±73.37). The significance level was good in both therapies.

Table 6: Total monthly cost for single and combination drugs

Total cost	Combination drug	Single drug
Total Cost(Rs)per day	266.62	946.45
Total Cost(Rs) per month	9000.86	25904.28

Table 6 shows that the total cost per day and total cost per month, in combination drugs total cost per day were 266.62 Rs and total cost per month were 9000.86 Rs. and also in single drugs total cost per day were 946.45Rs and total cost per month were 25904.28 Rs.

DISCUSSION

A prescription based survey is considered to be one of the most effective methods to assess and evaluate drug utilization of medication and dispensing practice of pharmacist. It is also important to consider the recommendations of international bodies on hypertension, which help to improve prescribing practice of the physician and ultimately, the clinical standards. A continuous supervision is therefore required through such kinds of systematic audit, which provides feedback from the physician and help to promote the rational use of drugs.The present study observed in total 151 numbers of hypertensive patients out of which males 96 (63.6%) were more prevalent than in females 55 (36.4%).The similar study conducted by Shymal Kumar Das et al, [7] in assessing the growing trend of prevalence of hypertension in India reveals that the same results males are found to have more hypertensive's compared to female. The present study results do not concord with the observations of above study.[8] The reason for this may be male patients having number of risk factors like smoking, alcohol intake, working environment which made them more prone to develop hypertension.

Hypertension is an important setting, which were worry for economic evaluations because of the wide range of issues involved for the individual and society. It is one of the most expensive diseases as far as treatment is concerned, as it generates higher health care expenses than those produced by other disease. According to our study single drug total 228 (4.15±2.84) (116.16±84.84) drugs were prescribed, out of these prescription containing maximum number of drugs were amlodipine 41(18.0%), the cost of the prescription per day is (3.51±0.38) and cost per month is (105.37±11.33). followed by Furosamide 39(17.1%) (3.00±0.00) (90.51±0.22), Enalapril 21(9.2%) (2.84±0.48) (85.09±14.91), and also total combination drug cost 79 (3.51±1.88) (134.38±93.79) per day and per month, in that maximum number of drugs from the Furosamide+Spiranolactone 19 (24.1%), the cost of the prescription per day is (2.74±0.29) and cost per month is (82.23±9.60), followed by Losartan+Hydrochlorthiazide (6.38±0.00) (204.16±49.42), Clopidogrel+Aspirin 13(16.5%) (2.91±0.05) (87.18±1.50), and Amlodipine+Atenolol 9(11.4%) (3.10±1.19) (134.38±93.79). Our study showed that more number of drugs from the combination therapy was more significant as compared to monotherapy, and also study showed that comparison of cost for single and combination drug the total cost (Rs) per day in combination drug were 266.62 Rs and total cost (Rs) per month were 9000.86 Rs, and total cost (Rs) per day in single drug were 946.45 Rs and total cost (Rs) per

month 25904.28 Rs. The result shows the better to use the combination therapy in hypertensive patients; this is one of the therapies which helps patient to lower cost and minimum side effects.

In our study the cost of the antihypertensive medication (Single and Combination therapy) prescribed was analyzed by calculating the average cost of the medicine(s) per month. The average treatment cost per month was calculated and compared with various classes of antihypertensive agents against the goal blood pressure achieved in the particular stage of hypertensive patients. The average market price of the medications was taken from the latest edition of Indian Drug Review (IDR) (July-August 2010) and Current Index of Medical Specialties (CIMS). The medicine(s) whose monthly cost was lower with a greater control in blood pressure was considered to be cost effective for the patient.

Combination is really coming up because of the additive effect in lowering blood pressure and also cost effective and also cheaper as compared to monotherapy, this type of drugs are more effective based on the patients' socioeconomical conditions. Although fixed dose combination has the advantage of better compliance, but prescribers were not completely prescribed combination of drugs. The instructions regarding drug instillation/drug administration is another important aspect of prescription therapy. Patients usually have the habit of taking 2-3 doses resulting into the wastage of drugs like (missing the dose and take it in to 2-3 doses at a Stretch); this may cause any side effect and adverse effect, increased cost and poor compliance.

CONCLUSION

In our study we found that most of the hypertensive prescription contains monotherapy and also the therapy contains most cost effective drugs as compared to combination therapy. The results of this study show that patients were un aware of the drugs and also they were illiterate. So the role of physician and pharmacist to give the proper instruction to the patients on drugs, dosage, route, and dose is required, the results of this study clearly demonstrated that the rationality behind these drugs was questionable. Our study showed that it's better to prescribe combination therapy because lot of clinical trials supports the combination therapy for cardiac disease.So this could be study subject for physicians, pharmacists for determining safety and efficacy of drugs.

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REFERENCES

1. Kurpad AV, Mony P, Vaz M. Chronic Disease in India - where next. Proc**.** Intl. Symp. Building Leadership Skills in Food and Nutrition Essential for National Development Central food training research institute 2006; 23-5.
2. Anonymous. The impact of chronic disease in India.[Online]. 2005 Aug 16 [cited 2005 Aug 21]; Available from: URL: http// www.who.int/chp/chronic_disease_reprt
3. Etuk E, Isezuo SA, Chika A, Akuche J, Ali M. Prescription pattern of antihypertensive drugs in a tertiary health institution in Nigeria. Annals of African Medicine 2008;7(3): 128-32
4. Gupta R, Gupta VP. Hypertension epidemiology in India: lessons from Jaipur Heart Watch. Current science 2009; 97(3) 10: 349-55
5. Dighore PN, Patil PH, Kuchake VG, Maheshwari OD. Prescription patterns of antihypertensive drugs. Indian journal of hospital pharmacy 2009;46:78-82.
6. Anonymous: The role of pharmacist within managed care organizations. Academy of managed care pharmacy.
7. Das SK, Sanyal K, Basu A. Study of urban community survey of India: growing trend of high prevalence of hypertension. International Journal Medical Sciences 2005; 2(2): 70-78.
8. Saseen JJ, Carter BL. Hypertension. In: Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM, editor. Pharmacotherapy In A Pathophysiologic Approach. 6th ed.:New York:Mcgraw Hill; 2005. p. 185- 218.