International Journal of Pharmacy and Pharmaceutical Sciences

ISSN- 0975-1491 Vol 8, Issue 3, 2016

Original Article

COST ANALYSIS OF ANTIHYPERTENSIVE AGENTS IN RURAL POPULATION: A PROSPECTIVE STUDY

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Received: 12 Dec 2015 Revised and Accepted: 25 Jan 2016

ABSTRACT

Objective: To calculate the direct medical and non-medical cost, indirect non-medical cost of prescription involved in the treatment of hypertension in rural inpatients at tertiary care teaching hospital.

Methods: A cross sectional, prospective and patient based cost of illness study was conducted in tertiary care hospital, Chidambaram for 12 mo and 267 new prescriptions was selected for the analysis. The data collected from the prescription included patient's socio-demographics, hypertension stage, drug therapy consumption, anti-hypertensive category and cost of each drug. Drug procurement costs were calculated, by using the TNG medical supply list of the most commonly prescribed drugs, for each drug on a daily and annual basis.

Results: Mean patient age were 60.6±10.5 y. 41.9% patients were having prevalence of hypertension at the age of above 60 y, 52.8% were males and 47.2% were females. The mean (systolic/diastolic) blood pressure was 141.8 mmHg (±15.2). Average annual direct medical costs were found to be ₹1,408,082.4, average annual direct non-medical cost was ₹9171.4 and the average annual indirect non-medical costs incurred by productivity loss were ₹10789.2.

Conclusions: Direct and indirect non-medical costs have incurred high when compared with the other costs. The annual average total direct (medical and non-medical) costs per patient and total cost of illness were ₹1,417,253.8 and ₹27,993,470.0 respectively.

Keywords: Cost-of-illness, Hypertension, Therapy consumption, Direct medical and non-medical cost, Indirect non-medical cost and morbidity cost

INTRODUCTION

Hypertension is a major health threatening problem. The prevalence of hypertension is predicted to be 60% increase from 26.4% in 2000 to 29.2% in 2025 throughout the globe [1]. This is one of the leading causes of death and disability, particularly in developing countries. The hypertension may lead to following complications: cardiovascular diseases (CVD), diabetes mellitus, unstable angina, myocardial infarction (MI), dilated cardiomyopathy (DCM), diabetic foot ulcer, diabetic retinopathy, hypertensive retinopathy, unstable angina, hypothyroidism and hyperthyroidism. Among them CVD is a majority and projected to cause 4.6 million deaths in India by 2020. There are many studies reported the incidence of hypertension.

In India one of the study reported the average prevalence of hypertension is ranging from 10 to 30.9%. Another study has stated the prevalence is 25% and 10% in urban and rural inhabitants respectively [2]. The therapeutic goal of the hypertension treatment is to reduce the blood pressure and to control its associated comorbidities with appropriate selection of drug and/or lifestyle modifications [3]. The WHO and the European society of hypertension recognize that the early death and disability caused by cardiovascular disease is a big economic burden for any country, but could be solved by preventive measures, particularly through better control of hypertension [4].

"Pharmacoeconomics (PE) is an established sub-discipline of health economics concerned with the evaluation of pharmaceutical products in terms of their value for money [5]. Pharmacoeconomics has been defined as the description and analysis of the cost of drug therapy to healthcare systems and society and research is the process of identifying, measuring, and comparing the costs, i.e., risks, and benefits of programs, services, or therapies and determining which the best alternate produces the best health outcome for the resource invested. The economic evaluation methodologies or tools can be separated into two major components: Economic and humanistic evaluation methods. Different economic evaluation techniques are cost benefit analysis (CBA), cost effectiveness analysis (CEA), cost minimization analysis (CMA), cost utility analysis (CUA) and cost of illness (COI). Cost of illness (COI) is used to identify and calculate the overall expenditure incurred to treat the disease and it may be calculated per person per annum. The unit of outcome for these studies will be expressed in terms of Indian rupees (INR). The COI involves two types' of components they are (i) Cost (ii) Consequences. Cost is defined as the value of financial resources incurred to treat the medical condition. A consequence is measured effects, outputs, or outcomes of the drug therapy of interest [6].

The health economics include three major components: (i) Direct medical and non medical cost (ii) Indirect non medical cost (iii) Intangible cost. The Direct medical cost includes drugs, medical supplies, and equipment, laboratory and diagnostic tests, hospitalizations, and physician visits. Direct nonmedical costs are any costs for services that are results of illness or disease, but do not involve purchasing the medical services and includes transportation, food, family care and home aides and whereas the indirect non medical costs includes lost wages (morbidity) and income forgone because of premature death (mortality). Direct non-medical cost is incurred to receive services other than medical care and it includes the amount spent by patients for transportation to and from healthcare facilities, extra trips to the emergency department, child or family care expenses, special diets, and various other out-of-pocket expenses. Indirect non-medical costs are the costs of reduced productivity (e. g., morbidity and mortality costs) and third category, the intangible cost of pain and grief, is often unquantifiable [6]. In this present study, the intangible cost due to hypertension is not received. The aim of the present study is to determine the cost involved in the treatment of hypertensive patients admitted in a tertiary care teaching hospital located in a rural part of South India.

MATERIALS AND METHODS

Study site

The study was conducted at a tertiary care teaching hospital having 1260 beds situated in Cuddalore District, Tamil Nadu, and South India.

Study design

Prospective, cross sectional, patient and hospital based cost of illness survey

Study perspective

Patient and provider perspective

Study duration and period

The study was conducted for 12 mo, between April 2014 and March 2015.

Study criteria

Inclusion criteria

1. Inpatients only
2. Patients prescribed with at least one antihypertensive medication.
3. Patients suffering from hypertension with or without multiple concomitant diseases like diabetes mellitus, hyperlipidemia, diabetic retinopathy, hypothyroidism, bronchial asthma, hypertensive retinopathy, CVA hemiplegia, unstable angina, tuberculosis, hypertensive nephropathy.
4. Patients are having ≥ 35 y, both the genders.
5. Patients who were willing to participate and provide informed consent form.
6. Patients suffering from hypertension more than three months.

Exclusion criteria

1. Outpatients only
2. A Patient who had discontinued the treatment for more than 3 d.
3. Patients who were having any form of induced hypertension like eclampsia.
4. Patients who were not willing to provide informed consent form.

Among 267 patients cross sectional survey was conducted and data were collected in a standard proforma. Direct cost was estimated by bottom-up technique and indirect cost was estimated by Human capital method. Informed consent form was obtained prior to start the study.

Ethical considerations

The study protocol was approved by the Institutional Human Ethical Committee of the hospital (Approval No.: M18/RMMC/2013).

Collection of data

292 patients were enrolled in the study. Among them, 25 patients were identified dropouts from the present study. Out of 25 patients, 12 patients were informed they were shifted their place of living. 2 patients were not willing to participate, 2 patients were without informing the reason they were discontinued study and 9 patients were lost to follow up. A proforma was prepared and tested with a small group of the study population. By using this proforma and data were collected from the registered patients.

Study proforma contains 3 domains: (i) Socio demographic features, which contains 12 parameters were age, gender, date of visit, number of visits, risk factors, population of living status, economic status, duration of hospital stay, qualification, yearly estimate household income, knowledge and awareness on hypertension and occupational status (ii) clinical features, which contains 5 parameters were systolic and diastolic pressure, drugs prescribed, poly pharmacy, therapy duration, hypertension with major/minor vascular complications (iii) monetary features, which contains drug cost, transportation cost, equipment and diet cost, medical supplies, diagnostic/laboratory cost, hospitalization cost and personnel cost. Pharmacoeconomic evaluation study was based on data collected through face to face interaction with patients in the general medicine ward for the duration of 12 mo diagnosis.

Study methods

Therapy consumption cost

Therapy consumption was based on cost per defined daily dose (C/DDD) in metric units [7]. All the costs were expressed in Indian rupees (INR) for the year of (2014–2015) throughout the study period. The DDD was used to calculate the medication cost.

Direct costs

Total direct costs = Total direct medical cost+Total direct non-medical cost.

Direct medical cost

In this study, the direct medical cost calculated consisted of the cost of medication, medical supplies cost, personnel cost, cost of diagnostic/laboratories and hospitalization cost.

Direct non-medical cost

Expenditure for incurred transportations by each patient during every hospital visits using Tamil Nadu Road Transport (TRT). Transportation cost 1km = ₹0.50 paisa.

Direct medical and non-medical cost computational study

Fixed cost

For estimating the equipment cost and diet costs were incurred by the hospital for providing the service.

Equipment cost

Equipment costs included the unit cost of Electrocardiogram (ECG), Echocardiogram (Echo) and Treadmill costs were collected from Coronary cardiac Unit (CCU). Estimating the cost of equipment received by the hospital for furnishing the service to the patient.

Diet cost

Diet cost was obtained from the hospital for the year [2014–2015].

Variable cost

Medication cost

Total medication cost = C/DDD X Number of patients involved X 365 d.

All prescribed drugs were rendering to the patient according Tamil Nadu Standard Treatment Guidelines (TNSTG) guidelines and hospital drug list.

Free cost components

Some drugs were furnished at free of cost to the patient by the hospital.

Medical supplies cost

Medical supplies cost includes sample (blood) collection tube; syringes, intravenous sets, needles, sutures, bandage, and sterile water for injection were calculated.

Diagnostic/laboratory cost

The diagnostic test cost is the sum of cost of Electro cardiogram, Echocardiogram and X-ray and blood glucose test, electrolytes test, lipid profiles, blood transfusion, thyroid–stimulating hormone (TSH) test were derived based upon the interviews with patients and from their records of the pharmacy.

Hospitalization cost

The cost of hospitalization included registration (prescription) cost (₹ 2.00/patient), admission cost (₹ 40.00/patient), staying charges per day, food items and drinks, other items were computed in relation to patients who needed hospitalization for diagnosis and treatment of hypertension. The hospitalization costs were collected from the first day of admission to discharge from the hospital.

Table 1: Data on socio demographic and clinical features of hypertensive patients with or without multiple comorbidities (N = 267)

Sociodemographical features	Number of patients (%)		
	N = 267 (%)	Male (N = 185)	Female (N = 82)
Age group (in years)			
35–55	92	70 (37.8%)	22
55–75	155 (58.0%)	104 (56.2%)	51 (62.2%)
≥76	20	11	9
Risk factors			
Smoking+alcohol	134	134 (72.4%)	-
Caffeine+Betel nut	71	11 (5.9%)	60 (73.1%)
Tobacco+paan	62	40 (21.6%)	22 (26.8%)
Population of living status			
Urban	43 (16.1%)	32 (17.3%)	11 (13.4%)
Rural	224 (83.9%)	153 (82.7%)	71 (86.6%)
Economic status			
High	21 (7.8%)	12	9
Moderate	67 (25.0%)	54 (29.1%)	13 (15.8%)
Low	179 (67.0%)	119 (64.3%)	60 (73.1%)
Duration of hospital stay			
≥ 10 d	180 (67.4%)	124 (67.0%)	56 (68.3%)
≤ 10 d	87 (32.6%)	61	26
Qualification			
Primary (1-5thclass)	224 (83.9%)	157 (84.8%)	67 (81.7%)
High School (6–10 thclass)	37	22	15
Higher secondary (11th& 12th)	5 (1.8%)	5 (2.7%)	-
UG and PG	1	1	-
Yearly estimate household income (INR) [Min–Max]	400-10000	400-10000	400-2500
Mean	15108	17460	13644
Prevalence rate of hypertension	238 (89.1%)	166 (89.7%)	72 (87.8%)
Regular treatment rate of hypertension	151 (56.5%)	99 (53.5%)	52 (63.4%)
Knowledge & awareness of hypertension			
Yes	102 (38.2%)	53 (28.6%)	49 (59.7%)
No	165 (61.8%)	91 (49.2%)	74 (90.2%)
Occupational status			
Employee	37 (13.8%)	29	8
Self employee	31 (11.6%)	22	9
Housewife	19 (7.1%)	-	19
Laborer	180 (67.4%)	134 (72.4%)	46 (56.0%)
Clinical features			
Blood pressure classification based JNC VII			
120–139/80-89 [Pre hypertension]	37 (13.8%)	28 (15.1%)	9 (11.0%)
140–159/90-99 [Stage 1 hypertension]	72 (30.0%)	51 (27.6%)	21 (25.6%)
≥ 160/≥100 [Stage II]	158 (59.2%)	106 (57.3%)	52 (63.4%)
Poly pharmacy			
1-7 drugs	77 (28.8%)	51	26
≥ 8 drugs	190 (71.1%)	134 (72.4%)	56 (68.3%)
Drugs prescribed			
Single therapy	145 (54.3%)	101 (54.6%)	44 (53.7%)
Dual therapy	101 (37.8)	69 (37.3%)	32 (39.0%)
Triple therapy	21 (7.9%)	15 (8.1%)	6 (7.3%)
Therapy duration of hypertension			
< 1 y	32 (11.9%)	13	19
1-10 y	136 (50.9%)	112 (60.5%)	24 (29.2%)
10-20 y	71 (26.6%)	46	25
20-25 y	28 (10.4%)	20	8
Hypertension with major/minor vascular complications			
No complications	52 (19.5%)	21 (11.3%)	31 (37.8%)
CAD+Type II DM	165 (61.8%)	122 (66.0%)	43 (52.4%)
MI	25	13	12
DCM	10	10	-
Diabetic foot ulcer	2	02	-
Diabetic retinopathy	1	01	-
Hypertensive Retinopathy	1	01	0
Unstable Angina	4	01	03
Hypothyroidism	7	-	7

CAD: Coronary Artery Diseases; MI: Myocardial Infarction; DCM: Dilated Cardiomyopathy; INR: Indian Rupees (₹); N: Number of patients

Patient (personnel) cost

The hospital doesn't charge for physician visit every day.

Estimation of indirect non-medical cost

Indirect costs were associated the income or absenteeism from work (lost productivity) estimated by the human capital approach [8] was categorized into two categories: morbidity cost and mortality cost.

Measurement of morbidity cost

Morbidity costs are costs incurred for missing work (i.e., lost productivity). It was computed by multiplying the total number of days taken off due to hypertension for both the patient and family members, by the average gross earning per day per person in 2015, with the actual wage rate of the patient. Income data were observed from the admission slip in the patient's case sheets. In this study the method was utilized self-reported average wage rate. Daily loss of productivity was measured either by assuming age-specific wage or an occupation-specific wage applied in other studies.

Analysis of total annual cost of illness

Total annual cost of illness = Total direct cost of illness+Total indirect cost of illness

RESULTS

Socio demographic characteristics

Registered 267 patients were given their consent and participated in the present study and overall response rate is 91.4%. Among 267 patients, 69.3% were males and 30.7% were females in the study group. The average age of male and female patients was found to be 62.6 and 60.4 y respectively.

The higher number of hypertensive patients was observed in the age group of 55–75 y, 56.2%, 62.2% were males and females respectively. 72.4% of males were smokers and alcoholic addicts whereas 73.1% of females were using caffeine and betel nuts regularly.

Population living status, 83.9% of the rural population was living highest number than the urban living population (16.1%). Economical status, overall 67.0% of patients had a low economic status, 64.3% of males and 73.1% of females. Poly pharmacy, the overall poly pharmacy rate was 71.1%, males and females' patients 72.4%, 68.3% respectively. The mean number of poly pharmacy was 14.09±2.14. The Prevalence rate of hypertension was higher in males (89.1%) was observed during the period (2014–2015) while in the females it was observed as (87.8%). Overall, 56.5% study participants were regularly visited in the hospital, 53.5% of males and 63.4% of females. Knowledge and awareness on hypertension, overall 38.2% of patients had an awareness of hypertension, in that 28.6% of males and 59.7% of females.

Overall, 56.5% patients were regularly visited in the hospital, 53.5% of males and 63.4% of females. Knowledge and awareness on hypertension, overall 38.2% of patients had an awareness of hypertension, in that 28.6% of males and 59.7% of females.

Overall average monthly and annual household income was observed to be ₹1259, ₹15108 respectively. Household income range from ₹400 to ₹10,000/month and for females and males average annual household income was ₹13644 and ₹17460 respectively. In the ccupational category, overall 67.4% of laboring patients, 72.4% of male and 56.0% of female laboring. Therapy duration, overall 50.9% of hypertensive patients' therapy duration in 1≤ 10 y a nd 60.5% of males and 29.2% of females and overall 11.9% were early diagnosed diseases (less than 1 y). Overall, 61.8% of patients had multiple comorbidities in that males (66.0%) had higher co morbidities of (CAD+Type II DM) than females (52.4%). Data on socio demographic and clinical features of hypertensive patient's data were given in table No.1.

Total cost per annum of individual drug for the 267 hypertensive patients on oral dosage forms:

The total cost/annum of individual medication for the 267 hypertensive patients with multiple comorbidity data were represented in table No.2. Among 267 hypertensive, ramipril was administered to 228 patients and each unit price ramipril was ₹6.7/and total cost per annum (ramipril) was analyzed that ₹6,524,448.0 in 2015 and total medication cost per annum was ₹13,383,382.0/and percentage of the annual total direct cost of illness (medication cost) was 53.3%. On this, costs were included free cost components. Total free drug cost per annum was analyzed ₹1,704,112.0/in 2015 and enalapril maleate, atenolol and metformin drugs were specially provided for free of cost for hypertension with multiple comorbidities.

Table 2: Total cost per annum of individual drug for hospitalized patients on oral dosage forms (N = 267)

Drugs	Total Cost/annum INR (₹)	Total drug cost (in %)	(%) Annual direct COI	Drug administered [No. of patients]	% of patients administered
Ramipril	6,524,448.0	49.0	26.0	228	85.4
Metoprolol	1,604,394.0	12.0	6.41	198	74.1
Amlodipine	430,590.5	3.2	1.72	251	94.0
Telmisartan	182,573.0	1.4	0.72	61	22.8
Propranolol	547,792.0	4.1	2.18	134	50.1
Hydrochloro-thaizide	68,875.5	0.5	0.27	111	41.5
Nebivolol	20,440.0	0.1	0.08	56	20.9
Furosamide	37,814.0	0.2	0.15	259	97.0
Aspirin	19,053.0	0.1	0.07	261	97.7
Clopidogrel	655,248.0	4.9	2.61	264	98.8
Atorvastatin	1,305,532.0	9.8	5.21	263	98.5
Glimipride	143,080.0	1.0	0.57	196	73.4
Glipizide	139,430.0	1.0	0.55	191	71.5
Total	**11,679,270.00**				
Free cost components					
Enalapril maleate	756,280.0	5.6	3.02	259	97.0
Atenolol	80,592.0	0.6	0.32	92	34.4
Metformin	867,240.0	6.5	3.45	198	74.1
Total Free cost	**1,704,112.0**	12.7	6.7		
Total cost [Drugs]	**13,383,382.0**	100.0	53.3		

Assessment of direct and morbidity cost

Table No.3 demonstrated the annual direct cost analysis like equipment, diet, and medication cost, diagnostic/laboratory tests, hospitalization, personnel cost and transport cost were computed for hypertensive study groups. Among the study population, total mean value direct medical costs, direct non-medical costs, morbidity costs were analyzed to be ₹1,408,082.4, ₹9171.4, ₹10,789.2 respectively. The total COI was ₹27,993,470.0. Of this, the percentage of total cost of direct medical costs was 89.5%, 0.3% were direct non medical cost and 10.2% was morbidity costs. These are the factors were influenced cost of the hypertensive study population. In this study, direct costs were constituted the greatest cost constituent of the economical burden of illness, on the other hand medication cost estimates constituted the greatest constituent of direct medical consumptions.

Table 3: Annual direct cost analysis of the 267 hospitalized patients in hypertension management

Annual direct cost analysis					
COI	**Cost constituents**	**Total cost/year (₹)**	**Average cost (₹)**	**% Annual direct COI**	**% Total COI**
Direct medical cost	**Fixed cost**				
	Equipment	84,70,000.0	28,23,333.3	34.0	30.2
	Diet	28,78,829.0	4,650.0	11.4	10.2
	Variable cost				
	Drug	13,383,382.0	836461.3	53.3	47.8
	Diagnostic/laboratory tests	1,57,091.0	26181.8	0.6	1.0
	Hospitalization	111,020.0	22204.0	0.4	0.3
	Personnel	0.0	0.0	0.0	0.0
Direct medical cost		25,000,322.0	1,408,082.4	99.7	89.5
Direct non-medical Cost	Transport	1,121,40.0	9171.4	0.3	0.3
Annual direct cost		25,112,462.0	1,417,253.8	100.0	89.8

Data on table No.4 were represented the annual indirect cost analysis like patient and caretaker's income loss and also in this data were included total cost of illness. Estimation of total cost of illness is sum of annual direct and indirect cost analsis for hypertensive study population.

Table 4: Annual Indirect and total cost of illness for the 267 hospitalized patients in hypertension management

Annual indirect cost analysis					
COI	**Cost constituents**	**Total cost/year**	**Average cost**	**% Annual Indirect COI**	**% Total COI**
Indirect non medical cost	**Morbidity cost**				
	Patient income loss	1,347,960.0	5048.4	46.8	4.8
	Caretaker's income loss	1,533,048.0	5740.8	53.2	5.4
Total (annual indirect non–medical cost)		2,881,008.0	10789.2	100.0	10.2
Total cost of illness		27,993,470.0			100.0

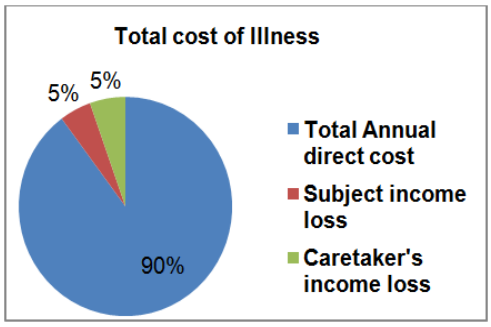

Fig. 1: Distribution of total costs of illness in hypertension care

DISCUSSION

Hypertension is a heterogeneous disorder not diseases, according WHO says that hypertension is a third leading killer in the world. Overall research study literature showing that, hypertension is one of the world's largest increasing economic burden on the rural population. To be reducing direct costs can be achieved by changing lifestyle habits like reducing dietary sodium intake, decreasing body weight, quitting smoking and reducing alcohol intake. In addition, anti-hypertensive medications can lower the risk of cardiovascular mortality in hypertensive individuals [8].

Economic burden of hypertension is much affect with rural population than the urban population. Because, urban population expending more cost on hypertension care than rural population, In rural counterpart, not having enough knowledge, awareness on proper pressure monitoring and due to too much expensive, unable to afford on their illness due to poverty, increasing illness with increasing economic burden, and that poverty because of illness has become a significant social problem [9]. Most of the people affect with hypertension at the age of ≥ 65 y elderly people. Hypertension is an important public health challenge worldwide because of its high prevalence and concomitant increase in risk of disease [10]. An economic burden of illness study carried on the study site where people coming in and around from rural area.

Regarding socioeconomic and demographic surveillance findings revealed some four factors: first, women (59.7%) had more prominent of knowledge than men (28.6%) with respect to awareness of hypertension. This finding is supported by other studies [11 & 12]. The outcome of the study, gender must be focused on the hypertension management also proper counseling can be given to male gender to improve their knowledge on hypertension. Second, the prevalence of hypertension, present study findings stated 89.7% men had more prevalence than women (87.8%). Our findings are in contradiction with a study conducted by Cai Le *et al.* in China, they reported 23.8% and 25.7% in men and women respectively. Third aspect is the therapeutic management of hypertension, the finding of the present study shown that women (63.4%) had a more prominent treatment rate on hypertension management than men (53.5%), which is similar to the study [12]. Fourth, average per annum income, concentrates on both genders (male and female), in that both annual income status was very poor and their household income not sufficient for their health management.

Among the direct medical costs, procurement of medicine costs was constituted over 47.8%. The total direct medical cost was largest

cost constituents more than other costs including the morbidity costs. Of this amount, diagnostic/laboratory (1.0%), hospitalization related costs (0.3%) and transportation costs (0.3%), which are low direct medical cost of illness.

Regarding average length of stay study findings revealed that, average length of hospitalization was 18.7 d to treat hypertension and multiple co-morbidities also. 67.4% of patients were staying more than 10 d and cost of medication was greatest constituent observed in this present study also only a few drugs were provided for free of cost components (12.7% of the total cost) to the patients by the hospital. Comparatively, in this study, total indirect medical cost was the second largest component.

Overall drug cost is ₹13, 383,382 (47.8%) for the entire study patient, whereas the total cost of anti-hypertensive medications alone is ₹9, 416,927 (70.3%). The present study shows that total drug cost was less than the study conducted by Muna *et al.* (Antihypertensive medications: 83.7% of total drug costs). Based on the reports of the present study, ramipril alone was administered the cost ₹6,524,448.0 (23.3%) of the total cost of illness. Ramipril has a cost/DDD of 78.4 (DDD–2.5 mg) and was prescribed for 228 hypertensive. Total cost of anti-diabetic drugs ₹ 2, 82,510.0 (1.0%) and total cost of anti-platelet drugs ₹6, 74,301 (2.4%) of total cost of illness. Total estimation of free drug components of anti-hypertensive drugs (Enalapril maleate+Atenolol) ₹8, 36,872 (2.9%) of the total cost of illness. Of this amount, enalapril maleate drug cost ₹7, 56,280.0 (2.7%) was administered to 259 patients. The ramipril has been indicated that to stabilize renal function in hypertensive diabetics might be responsible for its high degree of usage. Screening of patients for those at risk of nephropathy might be beneficial as well as subsequent regular monitoring of their renal function [13]. Overall estimated that, total cost per annum, largest constituents like equipment cost (34.0%), diet (11.4%), Medication cost (53.3%), patient income loss (46.8%) and Caretaker's income loss (53.2%) of annual direct and indirect cost of illness observed in the present study. Present, concerning personnel cost such as (Physician cost, pharmacist cost and nursing cost) considered as 0. Because patients do not spend any cost for health care professionals.

In rural population, mainly cost is greatest affordability also they had a lack of awareness of their illness, poor educational status, low socioeconomic status, poor monitoring on their complications and irregular treatment. These all the factors were influencing patients' lack of quality of care and to increase hypertensive complications. The clinical pharmacist in collaboration with other health care professionals' main important key role is, to give awareness on hypertension complications, proper monitoring blood pressure, consult with a physician regularly and special care to be given to rural population, prevention of hypertensive complications and can be improved the quality of hypertension care.

Study limitations

The limitations of the present are: (i) study conducted in only one site and sample size being very small when compared with the hypertensive population. (ii) The present is focused on only inpatients, and outpatients were excluded from the analysis because unable to collect their registration information and not enough sufficient data. (iii) This study does not measure patient's employment in the hospital follow-up period after patients' re-hospitalization. (iv) Some patients might have received medication during re-hospitalization; this medication would not be analyzed in hospitalized patient pharmacy claims. (v) Due to a less time period, we did not perform patient mortality cost and intangible cost of illness. (vi) Did not assess parenteral dosage form because they were administered to the very negligible portion of patients.

CONCLUSION

Our finding indicates that, total direct cost components were incurred higher than the other components, which was increasing the treatment burden for hypertension patients.

Hypertension leads to the economic burden in economically low patients from rural. The findings of the present study revealed that the direct medical cost is more which directly cause impact while purchasing the medicines. The patients are reluctant to purchase the medicines and not adhering to their therapeutic regimen. Our recommendation is to distribute low cost medicines at free of cost to the economy low segment of patients.

ACKNOWLEDGEMENT

I have gratefully acknowledged funding for this research was provided by the University Grants Commission (UGC)-Basic Scientific Research (BSR) Fellowship for successfully completed in this original research work.

CONFLICT OF INTERESTS

The author declares that they have no competing interests

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