RESEARCH ARTICLE

DRUG UTILIZATION EVALUATION OF CARDIOVASCULAR DRUGS IN OUTPATIENT DEPARTMENT IN A TERTIARY CARE HOSPITAL: A DESCRIPTIVE OBSERVATIONAL STUDY

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ARTICLE INFO	ABSTRACT

Introduction: Drug Use Evaluation (DUE) is a system of ongoing, systematic, criteria-based evaluation of drug use that will help ensure that medicines are used appropriately (at the individual patient level).

Methodology: It was an Observational Descriptive Study. Drug Utilization data was obtained from the prescriptions of the patients attending cardiology outpatient department in Government General Hospital. The data was collected and Defined Daily Dose of frequently prescribed drugs and prescribing indicators were assessed.

Results: Out of 569 patients, males and females were 287 and 282 respectively.51-60 years age group was commonly affected. Rural people were commonly affected than urban people. Hypertension was found to be major risk factor among the study participants. Coronary artery disease was the most commonly diagnosed disease. Clopidogrel, Atorvastatin, Isosorbide Dinitrate and Aspirin are most commonly prescribed. The average number of drugs per prescription was found to be 4.17. Percentage of drugs prescribed from National Essential Drugs list was 89.5% .The percentage of drugs prescribed by generic name was 72.8%

Conclusion: The most commonly prescribed medications are Clopidogrel, Atorvastatin, Isosorbide Dinitrate and Aspirin. Polypharmacy was not observed. Percentage of drugs prescribed by Generic name should be improved.

INTRODUCTION

Cardiovascular diseases are the largest cause of mortality, accounting for around half of all deaths resulting from non communicable Diseases. Overall, Cardiovascular Diseases accounted for around one-fourth of all deaths in India in 2008. CVDs are expected to be the fastest growing chronic illnesses between 2005 and 2015, growing at 9.2% annually, and accounting for the second largest number of NCD patients after mental illnesses. A more worrying fact is that the incidences of CVDs have gone up significantly for people between the ages 25 and 69 to 24.8%, which means we are losing more productive people to these diseases (International Heart Protection Summit September 2011). In 2010, of all projected worldwide deaths, 23 million are expected to be because of cardiovascular diseases.

In fact, CVDs would be the single largest cause of death in the world accounting for more than a third of all deaths (Global Burden of Disease, 2004). For CVDs specifically, in 2005, the age standardized mortality rate for developing nations like India, China, and Brazil was between 300-450 per 100,000, whereas it was around 100-200 per 100,000 for developed countries like USA and Japan (Coronary Heart Diseases in India. Mark D Huffman, September 2011).Improved healthcare in India has increased the average life expectancy from 48.8 years in 1970 to 64.1 years in 2009 (Leeder *et al.,* 2004), resulting in a growing aging population which faces an increased risk of heart diseases. Modifiable risk factors are those that can easily be changed to reduce the risk of the occurrence of the disease, while non-modifiable risk factors like age and genetic makeup can't be controlled. For example, the nutritional shift has moved a number of people to unhealthy eating habits. Between 1983 and 2004, while the per capita consumption of protein went down, the amount of fats intake increased by more than 25%, both in urban and rural

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areas (Dreze *et al.,* 2009). Smoking is a major cause of atherosclerosis a build-up of fatty substances in the arteries. A person's risk of heart attack greatly increases with the number of cigarettes he or she smokes. There is no safe amount of smoking. Smokers continue to increase their risk of heart attack the longer they smoke. People who smoke a pack of cigarettes a day have more than twice the risk of heart attack than non-smokers (Smoking and Heart Disease Clevel and Clinic). India is not just the diabetes capital of the world with more than 50 million patients, it also has the highest prevalence of metabolic syndrome and obesity - 20 million Indians are obese today with 70 million projected by 2025; 20% of Indians suffer from hypertension(Joshi SR *et al.,* 2007).The urban poor and the rural people fall into a vicious cycle; already suffering from long term material deprivation, unhealthy living conditions, and high levels of stress, they are more prone to risky behaviour like smoking and drinking. Levels of smoking and drinking are the highest amongst the lowest income quintile in India (Denis Xavier *et al.,* 2008). Drug use evaluation, sometimes referred to as drug utilization review, is a system of continuous, systematic, criteria-based drug evaluation that ensures the appropriate use of drugs. It is a method of obtaining information to identify problems related to drug use and if properly developed, it also provides a means of correcting the problem and thereby contributes to rational drug therapy (WHO, 2003).

Defined Daily Dose

Unit of measurement that estimates the proportion of patients within a community who receive a particular drug. Assumed average maintenance dose per day for a drug used for its main indication in adults (compliance is assumed).Proportion of the population that may receive treatment with a particular drug. Assuming that the duration of the study and the size of the sample adequately represented the population of patients visiting the hospital, drug utilization was expressed as DDD/1000/days (WHO, 1991)

DDD/1000/day=

$$\frac{\text{Total No. of disage units PRescribed z} \times \text{Strength of dosage unit} \times 1000}{DDD \times Duration\ of\ study \times Total\ smaple\ size}$$

DDD in Pharmacovigilance Studies

$$Adverse\ Drug\ Reaction = \frac{Frequency\ of\ ADR}{DDD/1000\ inhabitants/day}$$

DDDs Uses

- To describe and compare patterns of drug utilization
- To provide denominator data to estimate ADRs
- To perform epidemiological screening for problems in DU
- To monitor the effects of informational and regulatory activities

MATERIALS AND METHODS

The study was carried out at Government General Hospital, Kakinada which is 1050bedded tertiary care teaching hospital for duration of 4 months. It is a descriptive Cross sectional study. The project work was approved by the Institutional Ethical committee. Informed consent was waived since there is no interaction with the patient. All patients who are diagnosed with cardiovascular disease by the physician in the outpatient department were included in the study. Patients who are attending cardiology outpatient department but diagnosed with diseases other than cardiovascular in nature, Inpatients of cardiology ward, Patients who are not willing to cooperate were excluded from the study. The data required for the present study was acquired from the prescriptions and medical records of the patient. A data collection form which is very suitable for the present study was prepared .It consists of demographic data like age, patient O.P no., gender, area of residence ,risk factors present ,diagnosis ,list of drugs prescribed along with their doses .
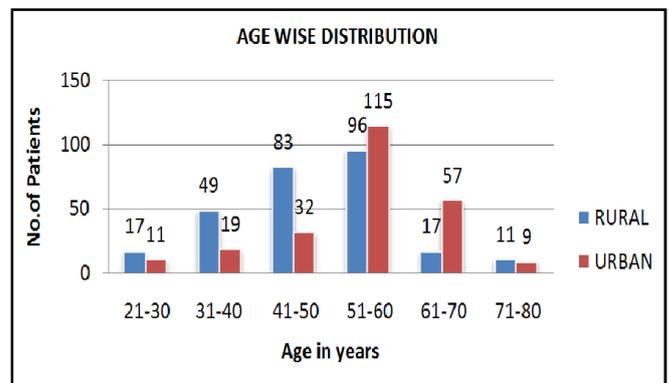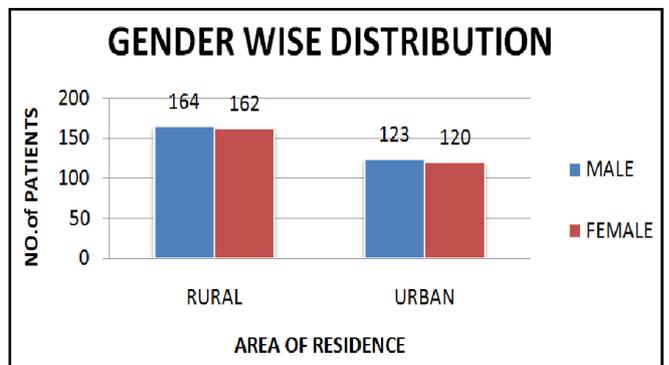
RESULTS

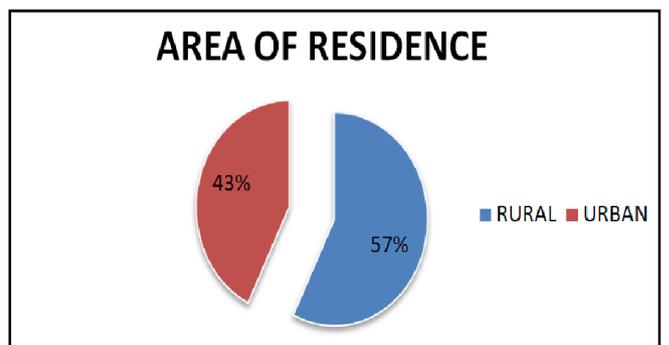**Fig 1. Age wise distribution**

Fig 2. Gender wise Distribution
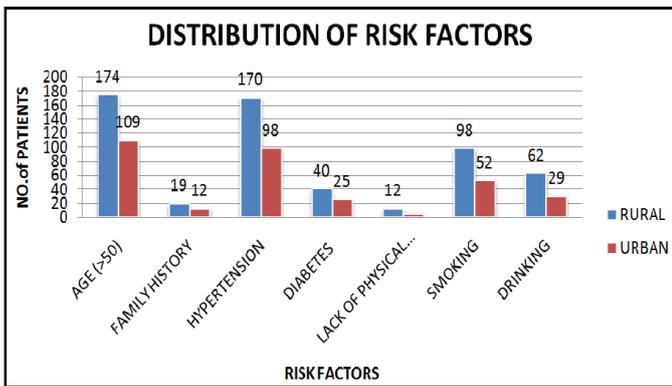

Fig.3. Area of Residence

Fig.4. Distribution of Risk Factors
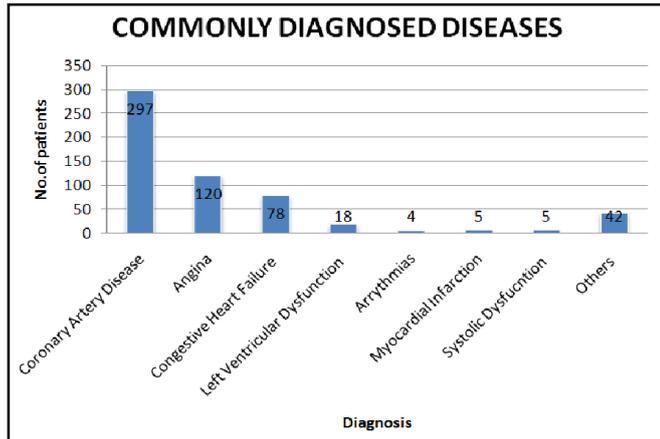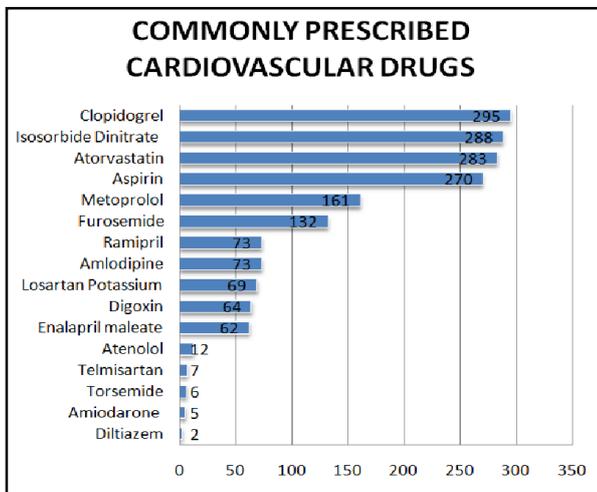

Fig.5. Commonly Diagnosed Diseases
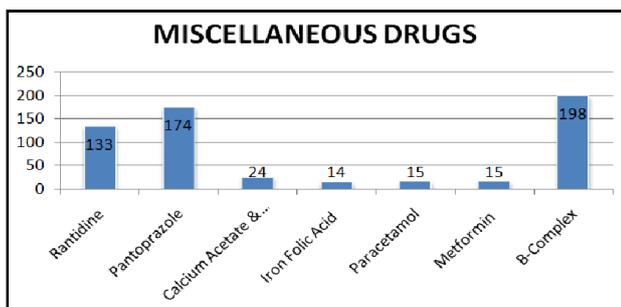

Fig. 6. Commonly Prescribed Cardiovascular Drugs

Fig.7. Miscellaneous drugs

Table 1. DDD of some cardiovascular drugs

Name of drug	ATC CODE	WHO DDD	Percentage	DDD/ 1000/DAY
Atorvastatin	C10AA05	20 mg	49.73%	4.14
Clopidogrel	B01AC04	75mg	51.84%	4.32
Isosorbide dinitrate	C01DA08	20mg	50.61%	4.21
Enalapril maleate	C09AA02	10mg	10.89%	4.54
Metoprolol	C07AB02	0.15g	28.29%	3.92
Furosemide	C03CA01	40mg	23.19%	1.93
Digoxin	C01AA05	0.25mg	11.24%	0.93
Ramipril	C09AA05	2.5mg	12.82%	21.08
Amlodipine	C08CA01	5mg	12.82%	1.06
Losartan	C09CA01	50mg	12.12%	0.6

Table 2. Prescribing Indicators

Average no. of Drugs/Prescription	4.17
Percentage of Drugs Prescribed by Generic Name	72.8%
Percentage of Drugs Prescribed From National Essential Drug List	89.5%

DISCUSSION

Age Wise Distribution

The age distribution of patients showed that patients of age group 51-60years constituted the highest number 16.87% and 20.21% in urban and rural population respectively. Similar findings with regards to age group were reported in studies conducted by Al-Junid *et al.* (2007), Farhana Afroj *et al.* (2012), and George *et al.* (2013). However, in a study conducted by Raj Kumar Venisetty *et al.* (2014), it was found that patients with age group of 60-66years were high in number. Some studies have also shown that South Asians acquire CHD at younger ages compared with other populations, and this appears to be explained by their higher levels of risk factors at younger ages (Joshi *et al.,* 2007). The average life span has increased due to improvements in medical care; the rapidly ageing population, more prone to NCDs, will also fuel the growth of NCDs over the next few decades (Mark Huffman. 2011)

Gender Wise Distribution

In our present study Males (50.43%) were most commonly affected than Females (49.57%).However, there is less difference between the proportion of males and females suffering from cardiovascular diseases in our study. Similar findings were observed in studies conducted by Farhana Afroj *et al.* (2012), George *et al.* (2013), Abdul Muhit *et al.* (2012), Pranay Wal *et al.* (2013). But in a study conducted by Fahad Jibran Siyal *et al.* (2014) it was reported that Females were most commonly affected than males. Before age 55, women have a lower risk for CHD than men. Estrogen provides women with some protection against CHD before menopause. After age 55, however, the risk of CHD increases in both women and men (Who is at risk of heart disease, 2014). Gender differences in traditional risk factors, such as smoking, obesity, hypertension, high plasma total, and low high-density lipoprotein cholesterol (typically less favorable among men) explain only 40% of the variation in the gender ratios of CHD mortality in 24 countries (including Russia, Lithuania, and Poland)(Jackson R *et al* 1997) Unfortunately, similar analyses using psychosocial coronary risk factors are unavailable.

Area of Residence

In our present study, rural population (57%) was most commonly affected than urban population. However, in a similar studies conducted by Abdul Muhit *et al.* (2012), Zubair Khalid Labu *et al.* (2013), it was reported that urban population was most commonly affected. Given the issues of affordability, accessibility, and quality of healthcare, mortality rates from heart diseases are much higher in the economically underprivileged population. They tend to ignore the disease due to poor access to healthcare, high cost of treatment, social stigma, and low awareness. Seeking treatment would also mean missing wages and reduced productivity, and for those in rural settings, often an additional cost of transport to reach the nearest health facility (Global Burden of Disease. 2004). Data also suggests that although the prevalence rates of CVD in rural population will remain lower than that of urban populations, they will continue to increase reaching around 13.5% of the rural age group of 60-69 as compared to 22% of urban age group of 60-69. The prevalence rates among younger adults (40 years and above) are also likely to increase (Shraddha Chauhan *et al.,* 2013)

Distribution of risk Factors

The most common risk factors (both in rural and urban) based on the frequency of occurrence in the present study are Age, Hypertension, Smoking, Alcohol, and Diabetes. In a similar study conducted by Pranay Wal *et al.* (2013) Hypertension was found to be the major risk factor apart from age. INTERHEART study reported that standard risk factors such as smoking, abnormal lipids, hypertension, diabetes, high waist-hip ratio, sedentary lifestyle, psychosocial stress, and a lack of consumption of fruit and vegetables explained more than 90% of acute CHD events in South Asians(Yusuf S *et al.,* 2004) . Smoking, another key risk factor, has also increased significantly. Around 14% of Indians smoke daily and increasingly younger people are taking up smoking. Smoking is a major cause of atherosclerosis, and doubles the chances of mortality from heart diseases (Smoking and Heart Disease, Clevel and Clinic). Socioeconomic determinants like improved access to healthcare, higher income levels and globalization, and urbanization drive increases in CVD risk factors (Global Burden of Disease, 2004). Between 1983 and 2004, while the per capita consumption of protein went down, the amount of fats intake increased by more than 25%, both in urban and rural areas (Dreze *et al.,* 2009). This, coupled with reduced physical activity, gives rise to intermediate risk factors such as hypertension and obesity. The Jaipur Heart Watch studies in India evaluated multiple cardiovascular risk factors in urban middleclass subjects using a multiple cross-sectional study design over a 20-year period from 1991 to 2010. Over this period in these urban subjects, the prevalence of smoking declined, hypertension did not change significantly (due to increased awareness and treatment), while all other risk factors such as obesity, truncal obesity, hypercholesterolemia, diabetes and metabolic syndrome increased significantly(Gupta *et al.,* 2012).

Commonly Diagnosed Diseases

The commonly diagnosed cardiovascular diseases are Coronary artery disease, Angina Pectoris and Congestive Heart Failure which accounts for 52.1%, 21.1% and 13.7% cases respectively. Rapid socio-economic growth in developing countries is increasing exposure to risk factors for CADs, such as diabetes, dyslipidemia, hypertension and smoking (Okrainec *et al.,* 2004). Increasing rate of CAD mortality and the projected rise in CAD mortality for 2020 in the developing world necessitates immediate prevention and control measures (Reddy *et al.,* 1998). As per predictions from studies by the National Commission for Macroeconomics and Health, Government of India, the number of patients with CAD is set to increase over 60 million by 2015 (Indrayan, 2005).

Commonly Prescribed Cardiovascular drugs

Clopidogrel (51.8%) and Aspirin (47.4%) are most commonly used Antiplatelet. Similar findings were observed in studies conducted by Pranay Wal *et al.* (2013), Shazia *et al.* (2015), Md. Abdul Muhit *et al.* (2012), Md. Zubair Khalid Labu *et al* (2013) .The commonly used beta blocker was Metoprolol (28.2%). Similar findings were observed in studies conducted by Pranay Wal *et al.* (2013), Md. Abdul Muhit *et al.* (2012). The most commonly used Diuretics are Furosemide (23.19%) followed by Torsemide (1.05%). Similar findings were observed in study by Prasanna Kumar *et al.* (2015). The commonly prescribed Angiotensin Receptor Blocker was Losartan (12.1%) followed by Telmisartan (1.23%). The commonly used Angiotensin Converting Enzyme inhibitor was Ramipril (12.8%) followed by Enalapril (10.8%).Amlodipine (12.8%) was the commonly prescribed Calcium channel blocker. Similar findings were observed with Raj Kumar Venisetty *et al.* (2014). The commonly prescribed Organic Nitrate was Iso sorbide Dinitrate (50.6%). But in studies conducted by Abdul Muhit *et al.* (2012), Zubair Khalid Labu *et al.* (2013) Nitroglycerine was most commonly prescribed.

Conclusion

The most commonly prescribed medications are Clopidogrel, Atorvastatin, Isosorbide Dinitrate and Aspirin. Polypharmacy was not observed. Percentage of drugs prescribed by Generic name should be improved. The percentage of drugs prescribed form national Essential Drugs List was satisfactory but still have to be improved.

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