Original Research Article

Study of utilisation trends of drugs in patients admitted with cardiovascular diseases at a tertiary care hospital in Goa

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ABSTRACT

Background: CVDs have emerged as a leading cause of mortality and morbidity in the world as well as in India. Drug usage is life saving and at times many drugs may be needed. Drug utilization studies aid to find the appropriateness of treatment, identify shortcomings if any, and provide a feedback to the healthcare providers to improve their management with drugs. So such types of studies are of vital importance in every hospital.

Methods: This was a prospective, observational study of 180 patients with CVDs admitted in medicine and cardiology wards of a tertiary care hospital, conducted through case records and patients’ interviews. Data was represented as mean±SD, number and frequency.

Results: Incidence of cardiovascular diseases was more in males (56.67%) than the females (43.33%). Average number of drugs prescribed per patient was 9.16 and that of cardiovascular drugs was 5.08 ± 2.15. Antiplatelets (88.88%) were the most commonly prescribed cardiovascular drugs followed by hypolipidemics (82.22%). About 15.06% of injectables and 1.2% of fixed dose combinations (FDCs) were prescribed. Drugs prescribed by generic names were 1.6% and those from the National List of Essential Medicines were 92.79%.

Conclusions: The results of this study suggested: polypharmacy, overuse of injections and low prescribing habits from essential drug list. Though antiplatelet, hypolipidemic use was higher, these are an essential part of treatment of certain CVDs.

Keywords: Case records, Prescription screening, Inappropriate drug use, Diseases of heart and blood vessels

INTRODUCTION

Globally around 70% of deaths occur due to non-communicable diseases (NCDs) such as cardiovascular diseases, cancer, diabetes and chronic respiratory diseases.1 An estimated 17.7 million people died due to CVDs in 2015, representing 31% of the deaths worldwide. Cardiovascular diseases are a group of disorders of heart and blood vessels and include: congenital heart diseases, cardiomyopathies, rheumatic heart diseases (RHD), heart failures, coronary heart diseases, and hypertension, cerebrovascular accidents (CVA) and peripheral vascular diseases.2

Unprecedented transformations in the factors contributing to morbidity and mortality have caused an epidemiological transition.3 Lifestyle changes, rapid urbanization, industrialization, poverty, globalization of pharmaceutical products being some of the contributing factors.1,3

Individuals with already established CVDs or who are at high risk of cardiovascular diseases (due to presence of one or more risk factors such as: hypertension, diabetes mellitus, hyperlipidemia) need early detection and management with appropriate medications and counselling.2
Drugs used in treatment of CVDs not only act on cardiovascular structures directly but also through regulators of cardiovascular functions like autonomic nervous system (ANS), central nervous system (CNS), kidney, autocrines and hormones.4 Drug therapies should be safe, efficacious and prescribed for appropriate therapeutic indications in correct dosage forms to obtain better patient outcomes.5 Polypharmacy and inappropriate prescribing can be a major health problem leading to adverse events and cost inflation.6

Periodic evaluation of drug usage patterns in each hospital setting can be of great help to monitor and supervise the drug use behaviours for which WHO core drug use indicators may be referred as guidelines.7

Drug utilisation studies thus provide a favourable feedback to treating physicians and help to modify treatment strategies, identify, and correct the shortcomings if any, thus providing the patients a rational and cost effective therapy.8,9 Owing to vulnerability of patients with CVDs to various complications, drug interactions and adverse events, these are a must in each hospital.

Considering the above facts this study was conducted in patients admitted with CVDs in medicine and cardiology wards of Goa Medical College - a tertiary care teaching hospital in Goa, with an aim to analyze the prescribing trends of drugs used in the treatment of CVDs, and give a feedback to the treating physicians which may help them to make any modifications in the treatment strategies, if needed.

METHODS

A prospective, observational study was conducted on 180 patients diagnosed with cardiovascular diseases (CVDs) admitted in medicine and cardiology wards of Goa Medical College and Hospital - a tertiary care teaching hospital in Goa.

It was carried out over a period of 3 months (April 2017 – June 2017). Approval from the Institutional Ethics Committee was taken. After obtaining written informed consent from the patients, case records of enrolled patients were analysed for patient details and details of drugs prescribed during the hospital stay.

Details of prescribed drug: name of the drug, dosage form, prescribing frequency, duration of treatment, and brand/generic name were noted.

Based on “WHO prescribing indicators” the collected data was analysed as follows:10

- Average number of drugs prescribed per patient encounter.
- Percentage of drugs prescribed by generic names

- Percentage of encounters of injectable drugs prescribed
- Percentage of drugs prescribed from list of essential medicines

All patients diagnosed with CVDs and admitted for > 24 hrs were included in the study. Patients who denied consent and those discharged within 24 hrs were excluded.

Statistical analysis

The values were represented as mean±SD for quantitative data and for qualitative data they were expressed as number and frequency.

RESULTS

Out of the 180 enrolled patients 102 (57%) were males and 78 (43%) were females (Figure 1).

![Figure 1: Gender wise distribution.](image)

56 (31.11%) patients belonged to the age group of 61-70 yrs followed by 41 (22.77%) in the age group of 51-60 yrs. 33 (18.33%), 29 (16.11%), 9 (5%), 7 (3.89%), 5 (2.78%) patients were in the age groups of 41-50 yrs, 71-80yrs, 31-40 yrs, 81-90 yrs and < 30 yrs respectively.

![Figure 2: Duration of hospital stay.](image)

Figure 2 illustrates the duration of hospital stay of patients.
Our study observed a variety of co-morbidities (Table 1). Hypertension and type 2 diabetes mellitus were the most commonly noted co-morbidities.

Ischaemic heart disease 73 (41%) was the most common CVD. Other CVDs observed were 44 (24%) CVA, 22 (10%) arrhythmias, 15 (8%) hypertension, 14 (8%) left ventricular failure, 7 (3%) RHD, 4 (2%) cardiomyopathies, 3 (2%) coronary heart blocks, 1 (1%) peripheral vascular disease and 1 (1%) infective endocarditis.

A total of 1650 drugs were prescribed to the study patients, out of which 916 (55.51%) were cardiovascular drugs. The most common route of administration of these drugs was oral 778 (84.9%) and 138 (15.06%) drugs were prescribed in parenteral dosage forms. Only 15 (1.6%) drugs were prescribed by generic names. 92.79% (850) were prescribed from the National list of Essential medicines (Table 2). An average of 5.08±2.15 cardiovascular drugs was prescribed per patient. Prescribing frequency of ≥5 drugs was seen in 98 (54.44%) patients, of which maximum i.e. 30 (30.61%) patients belonged to the age group of 61-70 years (Table 3).

Among the cardiovascular drugs, antiplatelets were the most commonly prescribed drugs in the patients followed by hypolipidemetics and the rest as shown in (Table 4 and 5).
Table 4: Various classes of cardiovascular drugs prescribed.

| Drug class             | No of prescriptions | Percentage (%) |
|------------------------|---------------------|----------------|
| Antiplatelets          | 160                 | 88.88          |
| Hypolipidemics         | 148                 | 82.22          |
| Anticoagulants         | 91                  | 50.55          |
| Fibrinolytics          | 17                  | 9.44           |
| ACE inhibitors         | 77                  | 42.77          |
| ARBs                   | 18                  | 10             |
| β Blockers             | 72                  | 40             |
| Calcium channel blockers| 35                 | 19.44          |
| Anti anginals          | 66                  | 36.66          |
| Diuretics              | 102                 | 56.66          |
| Cardiac glycosides     | 2                   | 1.11           |
| Anti arrhythmics       | 12                  | 6.66           |
| Ionotropes             | 16                  | 8.88           |
| Alpha blocker          | 4                   | 2.22           |
| Vasodilator            | 3                   | 1.66           |

Table 5: Distribution of cardiovascular drugs prescribed from various classes.

| Drug classes       | Drugs                  | No of prescriptions | Percentage (%) |
|--------------------|------------------------|---------------------|----------------|
| Antiplatelets      | Aspirin                | 58                  | 36.25          |
|                    | Clopidogrel            | 9                   | 5.63           |
|                    | Aspirin and clopidogrel| 93                  | 58.10          |
| Hypolipidemics     | Atorvastatin           | 145                 | 97.97          |
|                    | Rosuvastatin           | 3                   | 2.03           |
| Anticoagulants     | Enoxaparin             | 71                  | 78.02          |
|                    | Dalteparin             | 2                   | 2.19           |
|                    | Warfarin               | 10                  | 10.98          |
|                    | Acenocoumarol          | 8                   | 8.79           |
| Fibrinolytics      | Streptokinase          | 16                  | 94.12          |
|                    | Reteplasme             | 1                   | 5.88           |
| ACE inhibitors     | Enalapril              | 6                   | 7.79           |
|                    | Ramipril               | 71                  | 92.20          |
| ARBs               | Telmisartan            | 9                   | 50.00          |
|                    | Losartan               | 4                   | 22.22          |
|                    | Irbesartan             | 1                   | 5.56           |
|                    | Olmesartan             | 4                   | 22.22          |
| β Blockers         | Atenolol               | 1                   | 1.39           |
|                    | Metopropiole           | 57                  | 79.16          |
|                    | Nebivolol              | 7                   | 9.72           |
|                    | Carvedilol             | 5                   | 6.94           |
|                    | Bisoprolol             | 2                   | 2.78           |
| Calcium channel blockers | Amlodipine        | 31                  | 88.57          |
|                    | Cilnidipine            | 4                   | 11.42          |
| Anti anginals      | Nitroglycerine         | 30                  | 45.45          |
|                    | Isosorbide mono nitrate| 26                 | 39.39          |
|                    | Isosorbide di nitrate  | 5                   | 7.58           |
|                    | Ranolazine             | 4                   | 6.06           |
|                    | Ivabradine             | 1                   | 1.51           |
| Diuretics          | Furosemide             | 61                  | 59.80          |
|                    | Spironolactone         | 10                  | 9.80           |
|                    | Torsemide              | 16                  | 15.68          |
|                    | Mannitol               | 9                   | 8.82           |
|                    | Hydrochlorothiazide    | 6                   | 5.88           |
### Table 6: Parameters of present study compared with other studies.

| Parameters                                      | Present study | Other studies                                      | Reference No |
|-------------------------------------------------|---------------|---------------------------------------------------|--------------|
| **Age (61-70 yrs)**                             | 56 (31.11%)   | Aswani et al. 53 (29.44%)                         | 9            |
|                                                 |               | Chandana et al. 15 (24.55%)                       | 12           |
| **Gender**                                      | M= 57% ; F=43%| Saranya et al. (M=74% F=26%)                      | 8            |
|                                                 |               | Kamath et al.(M=81% F=19%)                        | 11           |
| **Duration of hospital stay**                   | 5.83±3.25 days| Vakade et al. (5.85 days)                         | 14           |
|                                                 |               | Aswani et al. (5.33days)                         | 9            |
| **Average no of cardiovascular drugs prescribed**| 5.08±2.5      | Aswani et al. ( 5.58)                            | 9            |
|                                                 |               | Kaur et al. (4.9)                                | 13           |
|                                                 |               | Al junid et al. (7.56±3.37)                      | 17           |
| **Total no of cardiovascular drugs prescribed as injectables** | 15.06% | Ravi et al. (7.89%) | 18 |
|                                                 |               | Aswani et al. (34.99%)                           | 9            |
| **Antiplatelet prescribing frequency**          | 88.89%        | Christian et al. (86.5%), Kamath et al.(95.13%)  | 19           |
| **Fixed dose combinations (FDC)**               | 1.2%          | Aswani et al. (7.65%), Barot et al (8%)          | 9            |
| **Drugs prescribed by**                        | Generic-1.6%  | Christian et al. generic-19.5%; brand-80.5%      | 19           |
|                                                 | Brand -98.4%  | Choudhary generic–16.28% ; brand–83.12%          | 21           |
| **Drugs from National List of Essential Medicines** | 92.79% | Christian et al. (75.7%) | 19 |
|                                                 |               | Al Junid et al. (28%)                            | 17           |

**DISCUSSION**

About 15 million people die each year prematurely due to NCDs which include CVDs. Low income and low middle income groups are mostly affected. In India too, CVDs are a rapidly growing health problem. With the ongoing research, rapid globalization of pharmaceutical products and advancement in the therapy of CVDs, it is important to study periodically the drug utilisation patterns to impart safe health care. In this study we made an effort to analyze the prescribing trends of the treating doctors in in-patients in the medicine and cardiology wards of a tertiary care hospital.

Our study showed higher incidences of CVDs in males than the females and this trend was seen increasing with age. These observations are similar to those of Saranya et al (males 74% females, 26%) Kamath et al (81% males and 19% females). Majority i.e. 56 (31.11%) patients ranged from 61 to 70 yrs of age, which is comparable to previous studies by Aswani et al showing 53 (29.44%) and Chandana et al. 56 (31.11%). One of the reasons for this may be associated co-morbidities and various risk factors at these ages. In this study it was also observed that hypertension and type 2 diabetes mellitus were the most frequently observed co-morbidities in 65 (36.11%) patients. A study by Kaur et al also reported hypertension and diabetes mellitus in 546 (49.69%) patients.

Average length of hospital stay noted was 5.83±3.25 days which is usually required for management of these patients. This shows similarity with study by Vakade et al (5.85 days) and Aswani et al (5.33days).

Ischaemic heart disease accounted for 41% of the patients while 24% of patients had CVA, this is comparable to study conducted by Hannan et al (96.75%) and Rathod et al. (41.59%).

In this study we also found that the average number of drugs prescribed per patient was 5.08 ±2.5, indicating polypharmacy, similar results were seen in the study of Aswani et al (5.58) and Kaur et al (4.9) but studies by Al julid et al showed a higher incidence (7.56±3.37).
CVDs, many a times, require emergency and or aggressive therapies which could be the reason for polypharmacy noted.

Drugs given parenterally were 15.06% which is higher than noted by Ravi et al (7.89%) and much lower than a study by Aswani et al (34.99%).\textsuperscript{3,18} This data is important since drugs prescribed parenterally add to the cost of medications and resultant adverse effects due to parenteral administration.

Antiplatelets, being important components of treatment strategies in CVDs, our study also showed 88.89% of prescribing frequency, this was followed by hypolipidemics 82.22%. These results are in accordance with the studies conducted by Christian et al (86.5%), Kamath et al (95.13%).\textsuperscript{1,19} Use of both drugs is justifiable as the incidence of IHD was higher in this study group.

98.7% drugs were prescribed as single drugs and is an appreciable finding as compared to that noted by Aswani et al (92.34%),\textsuperscript{9} 1.2% of fixed dose combinations (FDCs) were prescribed which were much lower than that documented by Aswani et al (7.65%), Barot et al (8%) respectively.\textsuperscript{19,28} Fewer prescriptions with FDCs decrease overall cost of treatment and prevent adverse drug events.

Our study showed 1.6% of prescribing habits by generic names. 98.3% drugs were prescribed by brand names and which was higher than results reported by Christian et al (19.5%, 80.5% - generic names and brand names respectively) and Choudhary et al (16.88% drugs prescribed by generic names and 83.12% drugs by brand names).\textsuperscript{19,21} Low instances of prescription of drug by generic names should be addressed appropriately as prescribing drugs by brand names not only inflates the cost but also evokes an adverse drug response due to confusing drug nomenclature.\textsuperscript{22}

Use of drugs from the National List of Essential Medicines was 92.79% which was higher than the findings of Christian et al (75.7%) and Al Junid et al (28%).\textsuperscript{17,19,23} This is a very good practice which provides effective health care and safety to community. Table 6 shows the comparison of findings of present study with other studies.

Thus, this study indicated trend towards polypharmacy especially in older age groups (61-70 yrs), a low frequency of drug prescribing by generic name and higher frequency of drug deliveries by injectable routes.

Limitations

- The present study was conducted on a small sample size of (180) patients and was for a short duration (3months), hence it may not represent the total population.
- Since this study was in a single tertiary care hospital (as Goa has only one), extrapolation of results would be better if also conducted in OPD patients and multicentric set ups.

CONCLUSION

This study showed higher incidences of drug use: as single agents and from essential drug list which are appreciable but prescribing habits of drugs by brand names were higher and a trend for polypharmacy in older patients was noted. Drugs used parenterally were higher but their use may be justified in these study patients with CVDs since some drugs have to be necessarily given parenterally in emergencies, and some are available in parenteral dosage forms only (eg. adrenaline, dopamine). Regular reviews of prescribed medications, tapering or withdrawing if the potential risk outweighs the benefit of their continuation, must be considered by health care providers.\textsuperscript{24} Several criterias for eg. Beers criteria – 2015, STOPP/START criteria, may be referred for safe prescribing in the geriatric age groups.\textsuperscript{25,26} Finally each hospital should compare their drug usage with standard treatment guidelines or frame the guidelines if not existent. All these will help to bring better clinical outcomes.

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