ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Prescription analysis of statins in patients with cardiovascular diseases and other comorbidities in various tertiary care hospitals at Salem district, Tamil Nadu

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ABSTRACT

The present study was conducted to analyse the prescription patterns of statins in patients with cardiovascular diseases and other comorbidities in various tertiary care hospitals at Salem district, Tamil Nadu, India. This prospective observational study was carried out for a period of 6 months from November 2017 to April 2018 in which 200 prescriptions were selected for the study by considering the inclusion and exclusion criteria. A total of 200 prescriptions were analysed. Patients of above 60 years' age group were mostly diagnosed n=87 (43.5%) of cardiovascular diseases. Male patients n=142 (71%) were more prone to CVDs than female patients n=58 (29%). Most of the patients were diagnosed with CAD n=66 (33%) followed by dyslipidemia n=33 (16.5%) and hypertension n=27 (13.5%). Out of 165 patients diagnosed with comorbidities, most of the patients were found to have DM about 104 (63%). The results showed that among the various statins, Atorvastatin-10mg about 100 (50%) was the most commonly prescribed drug than Rosuvastatin (n=80; 40%) and Simvastatin (n=20; 10%).

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INTRODUCTION

A prescription analysis is a powerful explorative tool to analyze the present trends of drug use and appropriateness of prescriptions. It's a descriptive and analytical method of assortment, quantification, understanding and analysis of the prescribing pattern furthermore dispensing and consumption for the advancement of existing medical care and improvement of patient safety (Taskeen M *et al.,* 2012). It is a part of the medical audit that will observe the prescription, analyze and recommends necessary modifications to attain rational therapy.

Nowadays, inappropriate drug use could be a common hurdle that receives the support of innumerable worldwide research studies to find out the safe and effective prescribing of drugs. Studies on prescription analysis are rising globally in several healthcare settings, which gives enormous medical, social and economic significance. Identification and assessment of the prescribing pattern is the first step towards the improvement of both medication quality and patient safety. Medication quality and patient safety need a rational prescription of medication and also used to avoid the inappropriate/irrational prescribing patterns (Al-Junid SM *et al.,* 2007).

Cardiovascular disease (CVD) is one of the leading cause of deaths, worldwide with mortality rates of around 235 per one lakh inhabitants (Barquera S *et al.,* 2015*)*. In the huge majority of patients, CVD is attributed explicitly to atherosclerosis. Atherosclerotic CVD (ASCVD) involves a variety of biological and behavioural factors as well as high plasma

cholesterol levels are playing a key role (Wilson PW *et al.,* 1988). Thus, the treatment of hypercholesterolemia-induced cardiovascular-associated diseases involves the use of statins, which are most effective in lowering serum cholesterol levels (Stone NJ *et al.,* 2014*)*.

The first commercially available statin medication was Lovastatin, in the year 1987 (Endo A., 2010). Since then, the utilization of statins proved the primary prevention of CVD by reducing the risk of disease (Hobbs FD., 2004). Additionally, the statins are widely used to slow the progression of the disease and also reducing the morbidities and mortalities associated with CVD. The existing guidelines issued by the American Heart Association (AHA) and the American College of Cardiology (ACC) wererevised in the year 2013, to reduce the risk of CVD. Since these guidelines considerably expand the population of patients eligible for statin therapy, which will dramatically increase the use of statin (Pencina MJ *et al.,* 2014). An increase in the use of statins is also due to the patients' cholesterol-inde- pendent (pleiotropic) effects (Liao JK *et al.,* 2005). As the patient population got benefited by the in- creased use of statins, it is crucial to understand the factors related to the use of statins, such as the cost of medication, adverse events, and interac- tions of the drug. Apart from that, the effect of statin in other diseases like stroke, cancer, autoim-mune/chronic inflammatory diseases could be es- tablished (Rader DJ., 2016).

Statins and atorvastatin are the best-selling prescription drug class and drug in the US and the world respectively. These drugs have a relatively high safety profile and have well-documented benefits in cardiovascular disease (Criqui MH *et al.,* 2004). Even though the statins are doing well in many patients, it can also cause adverse effects (AEs). So there's a need for creating awareness about the benefit and risk of all the drugs particularly, statins which are widely used, where even uncommon effects can cause significant public health impact (Buhaescu I *et al.,* 2007). The prescribing pattern should be safe, judicious, appropriate and economical to improve the quality of medical care. It conjointly can improve the standard of prescription writing (Martin RM., 1998).

Studies of drug utilization and prescribing patterns are helpful to identify the problems and also used to provide feedback to the prescribers so as to create awareness about rational drug use (Pradhan SC *et al.,* 1988). Previous studies showed that population-based prescribing patterns have a big impact on patient health. But the studies in developing countries are insufficient and incomplete in nature, mainly in tertiary care setups (Psaty BM *et al.,* 1993).

It's estimated that cardiovascular disease (CVD) will be the largest cause of disability and death in India by 2020. The country already has more than 118 million people with hypertension, which is predicted to increase to 213 million by 2025 (Mohan V *et al.,* 2007; Kearney PM *et al.,* 2005; Reddy KS *et al.,* 2006). In Tamil Nadu, the mortality rate due to cardiovascular diseases was 360-430 per one lakh population, which is highest in the country.

According to the study, 26.7 % of urban and 26.9 % of rural populations of Tamil Nadu were found to suffer from Hypertension. However, these rates were based on limited data; more epidemiological studies are needed in various districts/parts of Tamil Nadu to find out the exact statistics of CVD patients. So, in this present work, an attempt was made to study the prescription analysis of statins in patients with cardiovascular diseases and other comorbidities in various tertiary care hospitals at Salem District of the state Tamil Nadu.

MATERIALS AND METHODS

The study was carried out in 200 patients with cardiovascular diseases and other comorbidities mainly prescribed with statins in various tertiary care hospitals at Salem district, Tamil Nadu. All patients of both genders and who were in the age group of 21 years or above, prescribed with statins, during November 2017-April 2018 were included in the study. Patients with incomplete data, pregnant women and lactating mothers and patients who were in critical conditions were excluded from the study. Study procedure involves the collection of all relevant data from cases (demographic details, drugs, principal diagnosis and co-morbid conditions) obtained from various departments such as general medicine, cardiology, neurology, general surgery, nephrology, pulmonology, gynaecology, and urology. The data were collected according to the proforma and had analyzed using SPSS. Descriptive data analysis has been performed in the form of the percentage of demographic variables and drug therapy, and related issues were recorded.

RESULTS AND DISCUSSION

The data from the case sheets were noted, updated timely and were analyzed according to the needs of the study in order to yield a result/outcome. A total of 200 prescriptions were collected for the study from the various tertiary care hospitals of Salem district, Tamil Nadu. A detailed analysis of prescriptions based on social habits, the period of hospitalization, diagnosis, co-morbid conditions,
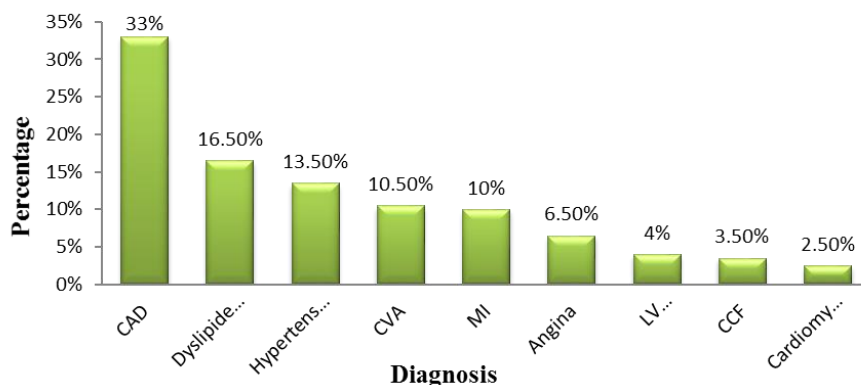
Figure 1: Analysis of prescriptions based on diagnosis

Table 1: Analysis of prescriptions based on total cholesterol before treatment

Sl. no	Range of total cholesterol (mg/dl)	Number of prescriptions (n)	Percentage (%)
1	201-210	34	17%
2	211-220	32	16%
3	221-230	28	14%
4	231-240	24	12%
5	241-250	24	12%
6	251-260	20	10%
7	261-270	16	8%
8	271-280	22	11%
	Total	200	100%
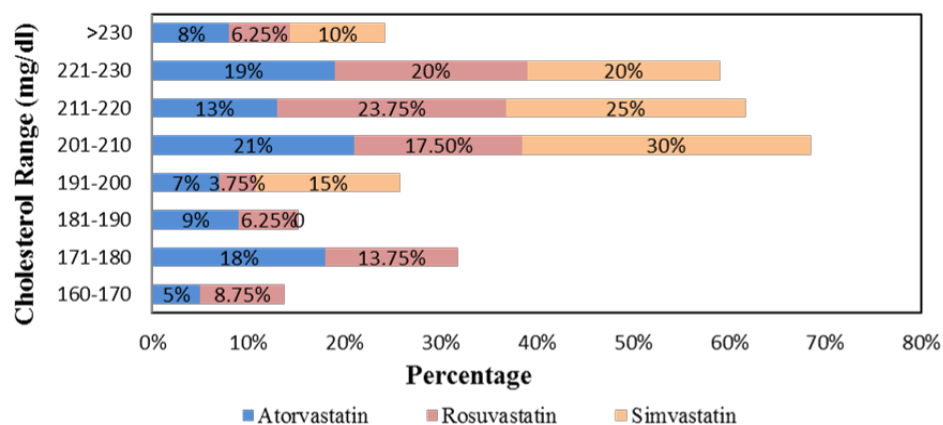
Figure 2: Analysis of prescriptions based on total cholesterol during the therapy

symptoms, commonly prescribed statins and their cholesterol levels were done.

The results showed that 142 (71%) were males and 58 (29%) were females and most of the 87 (43.5%) belongs to the age groups of above 60 years, followed by 69 (34.5%) in the age group of 51-60 years. It correlates with a study conducted by Mukesh Kumar *et al.,* 2016, which showed that most patients were males and in the age groups between 61-90 years were diagnosed with cardiovascular diseases.

Most of the patients 83 (41.5%) had the habit of both smoking and alcohol consumption followed by 57 (28.5%) patients with the habit of smoking, 44 (22%) patients with the habit of alcohol consumption and the rest of the 16 (8%) patients were found with none of the above-mentioned habits. Most of the patients 53 (26.5%) were hospitalized for > 10 days. The average number of days of hospitalization was found to be 6.64 ± 4.99 days. A study conducted by Kiran P. Vakade *et al.,* 2016, showed that the average period of hospitalization was 5.75 days.

Most of the patients were diagnosed with CAD 66 (33%) followed by dyslipidemia 33 (16.5%) and hypertension 27 (13.5%). A study conducted by Mukesh Kumar *et al.,* 2016, showed that dyslipidemia and hypertension were the most frequently diagnosed diseases (Figure: 1). In the present study, 165 patients were diagnosed with comorbidities like diabetes mellitus, chronic kidney disease, fatty liver, hyperthyroidism, lower respiratory tract infection, asthma, focal seizures,

abnormal uterine bleeding and urinary tract infection. The most frequently encountered comorbidities were diabetes mellitus 104 (63%) followed by chronic kidney disease 20 (12.1%), and the least comorbidity was UTI 1 (0.6%). It correlates with a study conducted by Sreedevi *et al.,* 2011*,* which showed that diabetes and thyroid disorders were the comorbidities for which statins were prescribed.

Dyspnoea 62 (31%) was found to be the most common symptom faced by patients followed by chest pain 56 (28%) and fatigue 40 (20%). Out of 200 prescriptions, Atorvastatin - 10mg (50%) was found to be the most commonly prescribed drug and dose. The prescribing order was found to be atorvastatin (n=100; 50%) > rosuvastatin (n=80; 40%) > simvastatin (n=20; 10%).

Out of 200 cases collected, 34 patients (17%) were found to have cholesterol ranges between 201-210 mg/dl followed by 32 (16%) were 211-220 mg/dl, 28 (14%) were 221-230 mg/dl, 24 (12%) were 231-240 mg/dl, 24 (12%) were 241-250 mg/dl, 20 (10%) were 251-260 mg/dl, 16 (8%) were 261-270 mg/dl and 22 (11%) were 271-280 mg/dl (Table: 1). The total cholesterol ranges during the therapy reduced to a range of 201-210 mg/dl for 21 (21%) patients out of 100 prescriptions on atorvastatin and 211-220 mg/dl for 19 (23.75%) patients out of 80 prescriptions on rosuvastatin and decrease in cholesterol range of 201-210 mg/dl were found in 6 (30%) patients out of 20 prescriptions on simvastatin (Figure: 2).

Total cholesterol levels before treatment and during the therapy were analyzed. The average total cholesterol for 200 patients was found to be 235.86 ± 23.33. The patients those who administered atorvastatin were found to be 203.59 ± 21.934. The patients those who administered rosuvastatin were found to be 204.67 ± 22.38. The patients those who administered simvastatin were found to be 211.2 ± 13.14. It showed significant reduction in total cholesterol levels by taking atorvastatin ($p < 0.0001$) followed by rosuvastatin ($p < 0.0001$) and simvastatin ($p < 0.0001$). All drug shows a significant reduction in TCL level. Mean difference or reduction in TCL levels are high in atorvastatin about 37.9 followed by rosuvastatin 28.5 and the least reduction in TCL level is seen with simvastatin 5.6.

CONCLUSION

Prescription analysis of statins is useful to find out the problems and also provide feedback to the prescribers, so as to create awareness about the rational use of the drug. From the above study, it may be concluded that prescribing rates of atorvastatin was higher in the study hospitals of Salem district, followed by rosuvastatin and simvastatin.

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