Research Article

Quality of Statins Prescription in Patients Admitted at a Tertiary Hospital in Southwestern Nigeria: Focus on Cost Containment

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ABSTRACT

Cost-effective statin prescription should be encouraged especially in resource-limited setting to reduce health expenditure. The aim of the study was to assess the patterns of statin prescription and cost implication in a resource-limited setting. Consecutive patients admitted into the six medical wards of the hospital were studied. Information on demographics, number and type and dose of statin prescribed was collected. Cost of statin prescription was calculated for each patient. Out of 1280 prescriptions encountered, a statin was prescribed in 59 (4.6%). The mean age was 61 years with 64% male and 36% female. A total of 62 statins were prescribed with two prescriptions containing two and three statins each. The generic prescription was low, only 18 (29%) statins were prescribed by generic name, Atorvastatin (67.8%; generic 9.7% and originator 58.1%) was the most prescribed. Average cost per month of statin was ₦3 273 ($17). Potential saving from 100% generic prescription was as much as 98%. The number of daily defined dose (DDD) per 100 patient days was 6.36 DDD. Under-dosing continues to be a concern, 83% of prescribed daily doses were less than DDD. A shift towards better cost-containing statin prescription is advocated. Interventions to encourage generic prescribing and improve dosing need to be implemented.

Keywords: *Cost, prescribing pattern, DDD, Statin, Generics*

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INTRODUCTION

Statins also known as 3-hydoxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase are used in the treatment of hyperlipidaemia. They exhibit their action by reducing low-density lipoprotein (LDL) and vascular inflammation; this coupled with decreased oxidative stress increases the stability of atherosclerotic lesions (Malloy and Kane, 2012). Statin prescription has increased in recent times especially among patients with hypercholesterolemia and heart-related diseases. With the expiration of patents, increasing number of generic substitutes which are cheaper and more cost-effective are now available for most statin class. The national drug policy published by the Federal Ministry for Health, Nigeria in collaboration with the World Health Organization (WHO) recommends that prescribing should be by International Non-Proprietary Names (INN) or generic names and when two or more drugs are therapeutically equivalent or several drugs are available for the same indication, preference shall be given to products with the best cost advantage (FMOH, WHO 2005).

However, this is not always the case as originator drugs are given preference by most prescribers (Akunne *et al*, 2013; Fadare *et al*, 2015). Inequalities in statin prescribing for primary prevention has been largely observed (Fleetcroft *et al*, 2014). Originator statins are very expensive and not affordable by the average Nigerian (Akunne *et al*, 2016); this coupled with the frequency of drug administration in patients, especially those at risk of a cardiovascular event, necessitates aggressive generic prescription to save medical cost and reduce out-of-pocket (OOP) spending on medication. Generic Simvastatin are cheaper than all others, possibly because of the longer length of patent expiration, increased Simvastatin prescription is advocated especially as statins are therapeutically equivalent in reducing LDL-cholesterol at comparable doses (Weng *et al*, 2010).

Prescribed daily dose (PDD) which is the average daily amount of a drug that is actually prescribed should be comparable to defined daily dose (DDD), which is the average maintenance dose of a drug used for its major indication in adults (WHO, 2003), for optimum patient response to

treatment. Low dose prescription of statin is becoming less frequent in some regions but not in Nigeria, a previous study among outpatients on statins in this institution showed prescribers favour low dose prescription (Akunne *et al*, 2016). Studies in South Africa, Netherlands, Sweden and the UK show increased use of generics from period of patent expiration (Bennie *et al*, 2012; Woerkom *et al*, 2012; Godman *et al*, 2015), such changes were not seen in Nigeria in the last study (Akunne *et al*, 2016).

This study assessed the clinical indications and prevalence of use of statins, level of generic prescription and the cost implication to patients on medical admission; compared trend in prescription of statin in Nigeria with other countries and differences in inpatient and outpatient statin prescription in our institution. We also aimed at evaluating the DDD per 100 patients' days as a measure of volume of medication usage. We furthermore assessed doses of statin for any perceptible change since the last study.

MATERIALS AND METHODS

This was a prospective cohort study. Convenience sampling was used to recruit patients. Prescriptions of consecutive patients admitted to six adult medical wards of the University College Hospital were studied. This study was conducted between January 2012 and August 2013 after ethical approval was obtained from the institutional review board ethics committee of the University of Ibadan/University College Hospital (UI/UCH IRB EC), Ibadan, Oyo state, Nigeria.

Only prescriptions containing statin were selected and entered into preformed templates. Statins prescribed, number and frequency of use, dosage, age, sex and diagnosis were obtained from patients' medical records upon admission and daily until the patient was discharged from the hospital. Prices of medications were obtained from the hospital pharmacy to evaluate the cost of the prescription. The volume of generic drugs prescribed was evaluated and represented as percentages. The total cost of all statins prescribed during the period was calculated. Potential savings from 100% generic prescription was calculated. A comparison was made between the PDD and recommended DDD. Total number of DDD per patient bed-days was calculated using: DDD/ Patient bed-days X 100

Data entry and analysis were done using the Statistical Package for the Social Sciences (SPSS) version 17. Nominal, ordinal and metric discrete variables are summarized as frequencies and presented as percentages while metric continuous variables are summarized as means (Bowers, 2009.

RESULTS

A total of 1280 patients were admitted to the clinics during the study period, out of which 59 (4.6%) had prescriptions that included a statin. Patients prescribed statins had cardiovascular (88.4%), endocrine (9.3%), and cerebrovascular (2.3%) diseases. The average age of patients was 61 years with more males (64%) than females (Table 1).

Atorvastatin was prescribed to 42 patients, Simvastatin, Rosuvastatin, and Fluvastatin were prescribed to 10, 9 and 1 patients respectively (Table 2). Most patients received one statin, only two patients had a prescription of more than one statin. Statins were mostly prescribed by brand name, only 18 statins was prescribed by their generic name out of the 62 statin prescriptions (Table 2).

Average total cost of statin prescription was ₦175 575($886.2) for all patients. Generic statin medication cost was ₦ 31 575($159.5) representing 18% of the total cost while originators cost ₦ 144 000($727) on the average. Potential saving from 100% generic prescription of statins was as much as 98%. Average monthly cost per patients on generics was ₦1 754($8.9) while patients on originator statins spent an average of ₦3 273($17) monthly. Monthly income of patients ranged from ₦50 000($252.5) to ₦100 000 ($505.1) on the average (Table 2). Under-dosing was observed in 56% of prescription, average PDD for Atorvastatin, Fluvastatin, Rosuvastatin and Simvastatin was 14.1mg, 20 mg, 7.9 mg and 21 mg respectively. The DDD per 100 bed days of patients was 6.36 DDD and 6.41, 8.54, 6.60 and 5.02 DDDs for Atorvastatin, Rosuvastatin, Fluvastatin and Simvastatin respectively (Table 3).

Table 1
Demographic/Clinical variable of patients admitted during study period

		Frequency	Percentage
Sex	Female	21	35.6
	Male	38	64.4
Age(years) <30		2	3.4
	30-39	1	1.7
	40-49	7	11.9
	50-59	12	20.3
	60-69	17	28.8
	70-79	17	28.8
	≥80	2	3.4
	Missing	1	1.7
Monthly Income			
	<₦10 000($50.5)	2	3.4
	₦10 000($50.5)- ₦50 000 ($252.5)	19	32.2
	>₦50 000($252.5)- ₦100 000 ($505.1)	31	52.5
	>₦100 000($505.1)	7	11.9
No of statins prescribed			
	1	57	96.6
	2	1	1.7
	3	1	1.7

Table 2
Frequency of generic/ originator statins prescribed to medical inpatients during study period

Drug	Generics n=18	Average monthly cost per patient ₦($)	Average total monthly cost ₦($)	Originators n =44	Average monthly cost per patient ₦($)	Average total monthly cost ₦($)	Total prescribed n=62
Atorvastatin	6 (9.7%)	2 250 (11.4)	13 500 (68)	36 (58.1%)	3 000 (15)	108 000 (545)	42 (67.8%)
Fluvastatin	1 (1.6%)	NA	NA	-			1 (1.6%)
Rosuvastatin	1 (1.6%)	1 425 (7.2)	1 425 (7.2)	8 (12.9%)	4 500 (23)	36 000 (182)	9 (14.5%)
Simvastatin	10 (16.1%)	1 665 (17)	16 650 (84)	-			10 (16.1%)

N number prescribed; % of all total statins prescribed; NA not available

Table 3
Doses of statins prescribed to medical inpatients during study period

Drug	Dosage (mg)				Missing	Total
	5	10	20	40		
Atorvastatin	2	21	13	1	5	42
Fluvastatin	-	-	1	-	-	1
Rosuvastatin	3	4	-	-	2	9
Simvastatin	-	3	5	2	-	10

Daily Defined Dose Atorvastatin=20mg; Fluvastatin=60mg; Rosuvastatin=10mg; Simvastatin=30mg

Table 4
Statin prescription according to disease condition of patients

Disease*	Atorvastatin	Rosuvastatin	Simvastatin	Total
Hypertensive heart/renal disease	8	1	3	12
Ischemic heart disease	2	1	1	4
Diabetes	6	-	2	8
Cerebrovascular disease	18	5	2	25
Hypertensive heart/renal disease and Diabetes	1	-	1	2
Ischemic heart disease and Diabetes	3	-	-	3
Hypertensive heart/renal disease and Heart failure	1	2	1	4
Hypertensive heart/renal disease and Ischemic heart disease and Diabetes	1	-	-	1
Others (Opthalmolpegia, NHS)	2	-	-	2
Total	42	9	10	61

* WHO.International statistical classification of disease and related health problems. 10ᵗʰ Revision

Most patients suffered from cerebrovascular disease (42.4%), followed by hypertensive heart disease (32.2%), ischaemic heart disease (13.6%) and Diabetes (13.6%). One patient had a combination of hypertensive heart disease, ischaemic heart disease, renal disease and diabetes (Table 4)

DISCUSSION

Increasing use of statins has been observed especially in patients with hypercholesterolemia and hypertension-related diseases. This increase is due to its perceived beneficial blood lowering and pleiotropic effects (Koh *et al*, 2008; Briasoulis *et al*, 2013). Generic statin prescription was very low in this study with only 18 of the 62 drugs (29%) prescribed by generic name. This is similar to findings from a previous study of statin prescription among outpatients where 33% of statins were prescribed by generic name (Akunne *et al*, 2016). Economic burden on patients in this instance is greatly increased as treatment cost in Nigeria including hospitalization cost and other overhead costs (i.e. laboratory tests) is borne by patients considering that some patients have an income of less than <₦10 000 ($50.5) per month.

Most concerns regarding generic prescription emerge from prescriber perception of their efficacy as inferior compared to originator drugs, issues concerning bioequivalence and the possibility of therapeutic failure arising from the use of generic medicines have also been raised (Fadare *et al*, 2015). However, the national drug policy in Nigeria calls for prescription of equally effective, well-

tried, safe and cheaper drugs in lieu of the most expensive ones (FMOH, WHO. 2005). Vast similarities exist between inpatients and outpatient's statin prescription (Akunne *et al*, 2016). High proprietary Atorvastatin prescription and 100% generic Simvastatin prescription was observed in this study. Atorvastatin was the most prescribed statin drug class differing with observation in the EU where there is a fall in Atorvastatin prescription with an increase in Simvastatin prescription. This is mostly due to the implementation of policies and initiatives to increase the prescribing of low-cost generics over more expensive originator statins and high-cost generics (Godman, 2009). In Nigeria however, we observe continued use of expensive patented statins and low generic prescription, this is all the more alarming because of low income earned by patients. Substantial savings can be achieved through increased generic prescribing; this study shows a potential saving of 98% on total cost with 100% generic prescribing. However, Prescribers' attitude remained unchanged by the availability of low-cost generic drugs. This underlines the need to enforce recommendations from the drug use policy (FMOH, WHO. 2005). An effective system for continuous follow-up and monitoring of prescribing attitudes should be set up, this would help detect changes towards rational prescribing. Rational prescribing that avoids under or over prescription is also advocated, under-prescription of statins has been observed in several studies. In South Africa, low dose Simvastatin prescription has been observed, however, PDD of Atorvastatin and Rosuvastatin were comparable to DDD (Woerkom *et al*, 2012). Another study between counties in Norway found that Atorvastatin and Simvastatin accounted for 79–87% prescriptions with estimated PDDs across all classes higher than the DDDs, observing up to twice the DDD for Atorvastatin were prescribed (Donohue *et al*, 2008). This is not true for Nigeria, our study findings show lower PDDs compared to DDDs. Further studies to evaluate the effect of lower PDDs on the lipid profile of the patients should be encouraged. Combination therapy could be avoided by optimizing dose, in the two prescriptions containing more than one statin, under prescription was observed.

There is a great need for reforms and intervention to improve generic prescription, not only for statins but for medications used for the treatment of all other ailments especially chronic diseases. Low generic prescription in Nigeria (Akunne *et al*, 2013) is particularly worrisome, especially as patients pay for their drugs OOP. Interventions such as prescriber education, a reward system for high generic prescription, extensive analysis of imported and locally produced generic statins to assure prescribers of their quality and bioequivalence to originator drugs and effective feedback systems should be put in place to improve rational drug use. Also, consumer education, which is proven to be effective (Hartz *et al*, 2007), should be introduced. Here a patient is made aware of all options available and hence, decide the most cost-effective medication to purchase. Contrary to advocated use of statins in inflammatory conditions such as osteoarthritis (Baker *et al*, 2011; Cheng *et al*, 2018), no such indications were observed here. However, a more extensive drug utilisation research is needed since such patients may be seen more on the surgical wards or clinics.

In conclusion, generic prescription remains very low with most prescribers opting for their more expensive counterpart. While a more extensive study is needed to verify low generic and sub-optimal dose prescribing across Nigeria, findings from this study reveal that these factors remain an issue.

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