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Research Article

Statin adherence and medication knowledge among Ischemic Heart disease Patients at a Tertiary Hospital in Northern Sri Lanka

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Abstract

Introduction: Cardiovascular disease is a major public health issue that accounts for 30% of all fatalities worldwide. Poor adherence to statin medication has been linked to poor clinical outcomes and increased healthcare costs. This study was carried out to assess the knowledge and adherence to statins and the association of selected factors among ischemic heart disease (IHD) patients attending the tertiary hospital Jaffna. Methods: A descriptive cross-sectional study was conducted among IHD patients using statins. Patients who were above 18 years old and who had taken statins for at least the past three months were selected. A systematic sampling technique was used to recruit patients. An interviewer-administered questionnaire was used to collect data. The data was analyzed using SPSS version 25. The Chi-square test and Kruskal-Wallis tests were used to assess the association between adherence and variables. Individuals who answered "0 days" to all three adherence questions were considered as high adherence; those who reported they forgot to take statin at least once in the previous week were considered as medium adherence, and those who reported that they purposefully added or missed statin for one day or more in the last week were considered as low adherence. A $p<0.05$ was considered statistically significant. Results: The response rate was 97.28% (n=430). 43.7% of patients showed medium adherence, 38.4% showed high adherence, and 17.9% showed low adherence. The mean statin knowledge score of patients was 6.31 (SD±1.51). Statins' knowledge (p=0.001), clinic visits (p=0.023), polypharmacy (p=0.038), support from family members/caregivers (p=0.014), and co-morbidities (p=0.034) showed statistically significant association with medication adherence. Conclusion: Adherence to statins and medication knowledge among patients was suboptimal. Statin adherence could be improved by considering associated factors in this study.

Introduction

The constriction or blockage of the arteries and veins, which provide the heart with oxygen and nutrients, causes Ischemic Heart Disease (IHD), which results in stable/ unstable angina, myocardial infarction, sudden death, and heart failure [1]. More than 80% of the global burden of cardiovascular disease occurs in developing countries. More than 13 million people died as a result of both IHD and Cerebrovascular disease in 2005 [2]. In Sri Lanka, major chronic non-communicable diseases were responsible for more than half of all deaths. For more than a decade, IHD has been the leading cause of hospital fatalities in Sri Lanka [3].

In the primary and secondary prevention of cardiovascular events, HMG-CoA reductase inhibitors (Statins) are suggested as the first-line lipid-lowering pharmacological therapy. Several

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recent investigations have shown that statins are effective in patients with IHD [4]. HMG-CoA reductase, the enzyme that catalyses the rate-limiting step in cholesterol production, is competitively inhibited by statins. Statins have a strong efficacy in lowering LDL and a limited efficacy in boosting HDL. Commonly used statins are atorvastatin, simvastatin, rosuvastatin, lovastatin, pravastatin, fluvastatin, and cerivastatin. Toxicities to the liver and muscle are the most serious side effects [5].

Adherence is defined as "the extent to which a person's behavior taking medication, following a diet, and/or implementing lifestyle changes corresponds with agreed recommendations from a health care provider" [6]. Poor adherence to statin medication has been linked to poor clinical outcomes, increased healthcare costs, hospitalizations, and fatalities. It is important in clinical practice to identify non-adherent patients to statins. This allows for immediate adherence-promoting therapies, reducing the unfavorable health effects [7].

Poor adherence and withdrawal of statin therapy led to an increase in cardiovascular events, cerebrovascular events, and mortality in both primary and secondary prevention. Statins discontinuation was linked to a 67% higher risk of acute myocardial infarction, implying a possible rebound effect after statin discontinuation [8].

Medication adherence is measured using direct and indirect methods. Measurement of the drug or its metabolite concentration in body fluids such as blood and urine, examination of the presence of a biological marker provided with the medicine, and direct observation of the patient's medication-taking behavior are direct measures. Indirect measures are prescription refill records, Medication Events Monitoring System (MEMS), the pill count method, and measures involving clinician assessments and self-reports (Patient Kept Diaries, Patient interviews, Questionnaires, and scales). Different self-reported scales are used to measure adherence [9]. In this study, adherence to statins and associated factors were assessed among patients with ischemic heart disease in a government tertiary hospital.

Methods

Study design

It was a hospital-based descriptive cross-sectional study.

Study setting and population

The study was conducted among patients with IHD using statins who attended the cardiology clinic at the Tertiary Hospital, Jaffna, Sri Lanka. Patients who were above 18 years old and who had taken statins for at least the past three months were selected.

Sampling method and sample selection

There is a study conducted in India on adherence to statins. The p-value from this study is 0.42 [10]. The sample size was calculated as follows.

$$n = \frac{(1.96)^2 \times 0.42(1-0.42)}{(0.05)^2}$$

n = 374.32

n = 375

The non-responding rate was considered to be 15%.

So, the actual sample size = (375 ×100)/90

= 442

A systematic sampling technique was used to collect data. The total calculated sample size was 442 patients. Clinics were conducted on two days, with approximately 1600 patients using statins attending per month. The sampling interval was 4 (1600/442 ≈ 4). The first patient was selected randomly among the first ten patients who visited the cardiology clinic. He/She was assigned as the

Table 1: Distribution of Socio-demographic details of IHD patients (n=430)

Socio-demographic characteristics	Frequency (%)
Age	
Elder (above 59 years old)	327 (76)
Adult (below 59 years old)	103 (24)
Sex	
Male	276 (64.2)
Female	154 (35.8)
Marital status	
Single	33 (7.7)
Married	353 (82.1)
Widowed	44 (10.2)
Level of education	
Graduate	26 (6)
Tertiary	69 (16)
Secondary	103 (24)
Primary	232 (54)
Occupation	
Employed	138 (32.1)
Unemployed	249 (57.9)
Retired	43 (10)
Monthly income	
>=25000	93 (21.6)
<25000	84 (19.5)
No income	253 (58.9)

first patient from whom every fourth patient was recruited for the study.

Study instruments

An interviewer-administered questionnaire was used to collect data. The questionnaire comprised of three sections (A, B, and C). Section A included questions regarding the factors influencing adherence to statins. Section B included a nine-item questionnaire to assess the statin knowledge, which included the name of the statin, purpose of the statin, administration method for the statin, medication side-effects, what should be done if side effects occur, and what action to take if a dose is missed, etc. Section C included questions to assess adherence to statins. Medication adherence was assessed using three questions [11].

Data collection

Data collection was conducted among IHD patients using statins, identified through their prescriptions during their waiting time. The study objectives were explained to the participants, and they were provided with an information sheet to know about the study. Written informed consent was obtained from patients before data collection.

Ethical approval

Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Jaffna.

Data analysis

The data were analyzed using SPSS 25 (Statistical Package for Social Sciences version 25). The Chi-Square test was used to assess the association between categorical variables, and a p-value less than 0.05 was considered a statistically significant association. Nine-item questions were used to determine the knowledge about statins. A total of 11 scores were given to the statins' knowledge questionnaire. The Kruskal-Wallis test was used to determine the association between adherence and variables.

Three questions from a previous study were used to measure medication adherence [11]. It was considered that forgetting to take a statin was the least significant form of adherence, and purposely not taking a statin or adding a statin was the most important kind of non-adherence. The score was categorized into three3 categories based on adherence: High, Medium, and Poor. Individuals who answered "0 days" to all three questions were considered as high adherence; those who reported they forgot to take statin at least once in the previous week were considered as medium adherence, and those who reported that they purposefully added or missed statin for one day or more in the last week were considered as low adherence.

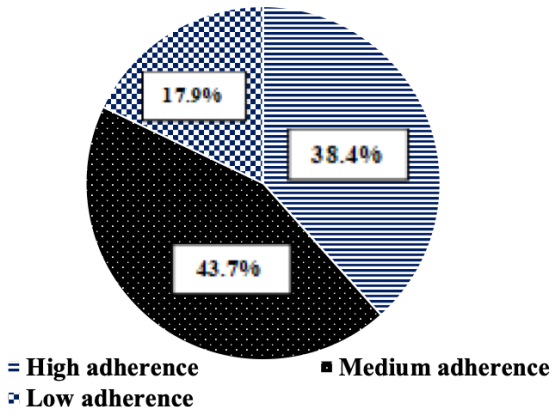

Figure 1: Adherence to statin among patients (n=430)

Table 2: Barriers to adherence to stain medication (n=266)

Adherence items	Frequency (%)
Forgot to take statin	189 (71.05)
Purposefully skip statin	75 (28.19)
Purposefully add statin	02 (0.75)

Results

Socio-demographic details of the study participants

Among 442 participants, the response rate was 97.328% (n=430). Table 1 depicts participants' socio-demographic characteristics. Three-fourths of the participants were elders. The majority are males, married, and have completed primary education. The mean age was 65.325 (±9.67) years. Most of the participants were unemployed (57.9%) and had no income (58.8%).

Medication adherence of participants

According to Figure 1, most participants showed medium adherence (43.7%), and only 38.4% showed high adherence, whereas the remaining showed low adherence to statins (17.9%).

Table 2 summarizes the barriers to adherence among IHD patients. Forgetting to take statin (71.05%) was the most reported barrier, followed by skipping statin doses.

Knowledge of statins among patients

The mean statin knowledge score of patients was 6.31 (SD±1.51). According to Table 3, most patients were aware of the frequency and time of taking statins, whether they needed to be used continuously or not, and the action on a missed dose. However, most patients were unaware of the name and dosage of their statin, its potential side effects, and the appropriate actions to take if side effects occur.

According to Table 4, factors significantly associated with adherence included, clinic visits, polypharmacy, support from family members/caregivers, and comorbidities. However, age, gender, marital status, occupation, monthly income, duration of treatment, inconvenience of treatment, and using traditional methods did not show a significant association with adherence.

According to Table 5, the knowledge of statins shows a significant association with medication adherence.

Table 6 shows a significant association between knowledge of statins and skipping the medication purposefully. However, there was no association between forgetfulness to take medication and knowledge of statins.

Table 3: Knowledge of statins among patients

S.No	Knowledge items	Correct response (N) %
1	Purpose of using statins	301 (70)
2	Statins should be used continuously	418 (97.2)
3	Name of statin	120 (27.9)
4	Side effects	71 (16.5)
5	What should be done if a side effect occurs	38 (8.8)
6	Know the dose	124 (28.8)
7	Frequency of taking statins	373 (86.7)
8	Time of taking the statin	362 (84.2)
9	Action on a missed dose	419 (97.4)

Discussion

The overall adherence rate was 38.4%, which is lower than reported rates in other studies, such as 53% in Israel [12], >63% in Canada [13], 42.31% in India [10], and 68.7% in the United States [14]. Differences in adherence rates across countries may be influenced by variations in the socio-demographic characteristics of participants and the methods of assessment.

Our findings demonstrated a significant association between regular clinic visits (p=0.023) and medication adherence. This finding is consistent with those from the study in Birmingham [15]. The total number of prescribed pills (p=0.038) was also significantly associated with adherence, which was aligned with some previous studies[15] [16] [17]. Increasing the number of drugs reduced adherence [16] [17]. However, a study done in Singapore reported that increasing the number of drugs improved adherence.[18] Additionally, support from caregivers/ family members (p=0.014) was significantly associated with statin adherence. Studies from the United States [19], Saudi Arabia [20], and South Asian countries [21] also reported that patients with family members/caregivers are more likely to adhere to medications than those without caregivers. So, family members/caregivers should be guided properly. Furthermore, the presence of co-morbid conditions (p=0.034) was significantly associated with adherence, which was in line with a study in the China [22]. However, patients having fewer comorbidities were more adherent to statins than patients with more comorbidities. It was because patients who had fewer comorbidities were careless about taking medication.

Socio-demographic factors, including education level, occupation, age, monthly income, sex, and marital status, did not show significant associations with statin adherence. These findings align with studies from India [23] and Ethiopia [24], but other studies highlighted the influence of socio-demographic factors on adherence [10] [14] [15].

The statin knowledge among patients with IHD was suboptimal. Knowledge regarding the name, dose, and side effects of statins was low among patients. A study done in India also reported low knowledge on the name, dose, and side effects of medicines among hemodialysis patients. Previous studies in Sri Lanka and Nigeria also demonstrated low medication knowledge among patients [25] [26] [27]. Patients should know basic information about medicines, such as name, dose, and indication, which is essential for the rational use of medicines. When patients travel somewhere without their medicines, they will face difficulty in identifying their medicines, which results in not

getting their medicines. Pharmacists could play a significant role in educating patients about medications.

Table 4: Association of selected factors on medication adherence among IHD patients (n=430)

Factor	Category	Medication adherence			p value (Chi-Square test)
		High adherence N (%)	Medium adherence N (%)	Low adherence N (%)	
Age	Elder	124(37.9%)	147(45%)	56(17.1%)	0.603
	Adult	41(39.8%)	41(39.8%)	21(20.4%)	
Sex	Male	109(39.5%)	125(45.3%)	42(15.2%)	0.150
	Female	56(36.4%)	63(40.9%)	35(22.7%)	
Marital status	Single	13(39.4%)	13(39.4%)	7(21.2%)	0.956
	Married	136(38.5%)	156(44.2%)	61(17.3%)	
	Widowed	16(36.4%)	19(43.2%)	9(20.5%)	
Level of education	Graduate	10(38.5%)	12(46.2%)	4(15.4%)	0.655
	Tertiary	20(29%)	36(52.2%)	13(18.8%)	
	Secondary	40(38.8%)	42(40.8%)	21(20.4%)	
	Primary	95(40.9%)	98(42.2%)	39(16.8%)	
Occupation	Employed	55(39.9%)	63(45.7%)	20(14.5%)	0.354
	Un employed	90(36.1%)	107(43%)	52(20.9%)	
	Retired	20(46.5%)	18(41.9%)	5(11.6%)	
Monthly income	>=25000	38(40.9%)	43(46.2%)	12(12.9%)	0.536
	<25000	33(39.3%)	38(45.2%)	13(15.5%)	
	No income	94(37.2%)	107(42.3%)	52(20.6%)	
Clinic visit	Always	158(39%)	180(44.4%)	87(16.5%)	0.023
	Sometimes	7(28%)	8(32%)	10(40%)	
Duration of treatment	<=5	91(38.7%)	98(41.7%)	46(19.6%)	0.521
	>5	74(37.9%)	90(46.2%)	31(15.9%)	
Inconvenience of treatment or medicine	Yes	19(47.5%)	15 (37.5%)	6(15%)	0.459
	No	146(37.4%)	173(44.4%)	71(18.2%)	
Total number of pills	Polypharmacy	156(38.8%)	179(44.5%)	67(16.7%)	0.038
	Non-poly pharmacy	9(32.1%)	9(32.1%)	10(35.7%)	
Using traditional methods	Yes	21(36.8%)	26(45.6%)	10(17.5%)	0.952
	No	144(38.6%)	162(43.4%)	67(18%)	
family members/caregivers support	Yes	161(40%)	169 (42%)	72(17.9%)	0.014
	No	4(14.3%)	19(67.9%)	5(17.9%)	
No of co-morbidities	<=2	119(35.7%)	147(44.1%)	67(20.1%)	0.034
	>2	46(47.4%)	41(42.3%)	10(10.3%)	

The present study failed to show statistical significance between duration of treatment and adherence. A study from Sweden supported this finding[28] However, a study from Japan showed a statistically significant association between these variables [29]. Knowledge of statins was significantly associated with adherence (p=0.001), which is similar to the finding from the Indian study [10]. However, our study showed that patients with low knowledge of statins have high adherence. Another study also showed similar results that, low health literacy group took 84% of medications by label instructions compared with the group with adequate literacy (77%) [30]. Regardless of knowledge, patients might fail to adhere to statins due to forgetfulness. Moreover, patients who have more knowledge about their

Table 5: Association between statin knowledge and medication adherence

Medication Adherence	Mean rank of Statin Knowledge	P value (Kruskal-Wallis test)
High	192.47	**0.001**
Medium	219.72	
Low	254.55	

Table 6: Association between knowledge of statins and medication adherence items

Questions on adherence to statins		Mean rank of statin knowledge	p value (Kruskal Wallis Test)
In the last week, how many days did you forget to take this medicine?	0 days	220.33	0.461
	1 or more days	211.72	
In the last week, how many days have you skipped this medication purposefully?	0 days	206.93	**0.006**
	1 or more days	251.33	

medications may be more likely to discontinue purposefully. It could be due to those patients knowing statin side effects, deciding to skip doses, which leads to poor adherence. So, it could be due to the fear of adverse effects, even though they are manageable [31]. Several studies reported that low medication adherence could be linked to side effects of medications [32] [33] [34] [10]. It gives more attention to healthcare professionals who provide counselling to patients. When they give counselling to patients, there should be a balance between disclosing side effects, and this can be achieved by proper language usage during counselling [31]. The risk of skipping statin doses should be clearly explained to patients, and that such risks cause an increase in severity of IHD in patients. Since statins effectively control cholesterol levels and protect against heart attack and stroke, patients should not stop taking statins due to side effects without consulting their physicians.

Attention should also be given to improve medication adherence, especially among patients without family or caregiver support, those with irregular clinic visits, those taking fewer drugs, and those having fewer comorbidities.

Limitations of the study

Even though the present study attempted to assess medication adherence, limitations were encountered during the study. Some participants were hesitant to disclose their missed or added doses, which affected the completeness of information from patients. Statins adherence was measured by self-reported methods, which might cause bias.

Conclusion and Recommendations

Adherence to statins among IHD patients is suboptimal. Medication knowledge on name, indication, dose, and side effects of medication was poor among patients. Special attention should be given to patients who did not regularly attend clinics, did not get adequate support from family members/ caregivers, and those having fewer drugs and fewer comorbidities. Further counselling on mediation should address the importance of adherence to statins in controlling IHD condition despite their side effects. Future studies are needed in other settings of Sri Lanka to get generalizable results.

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