Original Article

Adherence of Sudanese Coronary Artery Disease Patients to Secondary Prevention Medications at Elshaab Teaching Hospital, Sudan

Elhassan OBM[1], Mohamed SMI [2], Ibnouf MAM[3]

ABSTRACT

Background: Coronary artery disease (CAD), worldwide, is the most common type of heart disease. Adherence to the evidence-based medications for secondary prevention is associated with further improvement in the outcomes.

Objectives: To identify level of adherence towards secondary prevention medications among Sudanese ischemic heart disease patients.

Materials and Methods: This is a cross sectional hospital-based study, performed in the period from August 2012 through January 2013.Audit of Adherence of Sudanese Cardiac Patients to Secondary Prevention of Ischemic Heart Disease at Elshaab Teaching Hospital Khartoum, Sudan was done using a questionnaire for assessment.

Results: A total of 210 patients were included in this study. Their mean (±SD) age was 60.8(±12.3) years. Of them, 190 patients have high risk factors and 167 were on regular follow up. 195(92.9%)patients were on ACEI/ARBs and Aspirin. 116(55.2%) were on clopidogrel and 203 (96.7%) on statin.

Conclusion: 140(66.7%) patients were strictly adherent to medications, 21(10%) partially adherent and 49(23.3%) were totally not adherent. Lack of adherence was mainly due to poverty and high cost of medications.

Key words: Adherence, coronary artery disease, secondary prevention, evidence-based medications, Sudan.

Coronary heart disease (CHD) is the leading cause of death in the USA and other developed countries[1]. Recently there is an increasing attention to the evidence-based treatment after myocardial infarction[2,3]. A lot of studies and recommended guidelines have shown that discharge treatment of aspirin, clopidogrel, beta-blockers, Angiotensin Converting Enzyme Inhibitors (ACEI) or Angiotensin Receptor Blockers (ARBs), Aldosterone antagonist and cholesterol-lowering therapy after a Myocardial Infarction (MI) are associated with improved outcomes[4-7]. Adherence to evidence-based secondary prevention medications is associated with further improvement in outcomes and maximally reduces the burden of CHD[8-10]. Previous studies has demonstrated that adherence to post-MI medications, is poor[11,8,12]. Adherence is a priority for better-quality measures and quality-improvement interventions. Barriers to beta-blocker adherence for low-income populations need particular attention[13]. However, follow-up after myocardial infarction for long time is very limited in most studies, therefore difficult to assess adherence for more than one year post myocardial infarction. In addition, many of the studies have been conducted with limited clinical information about the population. Hence, there is limited research on factors associated with long-term adherence for recommended secondary prevention medications.

This study aimed at identifying level of adherence towards secondary prevention medications among Sudanese ischemic heart disease patients.

1. MBBS, Omdurman Islamic University, MSc. Clinical pharmacology (UMST)
2. Consultant cardiologist
3. Consultant surgeon
*Correspondence to: obm_bs@hotmail.com

MATERIALS AND METHODS:

Study design:
Crosssectional hospital based study.

Study area: Elshaab Teaching Hospital (STH) is a tertiary care hospital, in Khartoum state, Sudan. There are six cardiac outpatient clinics per week in this hospital.

Study Population:
Patients attending Cardiac Referred Clinic at Elshaab Teaching Hospital diagnosed as cases of Ischemic Heart Disease (IHD) or Acute Coronary Syndrome (ACS).

Study period: From August 2012 through January 2013.

Inclusion criteria:
All patients diagnosed and treated in hospital as ACS [ST Segment Elevation Myocardial Infarction (STEMI) or Non-ST Segment Elevation Myocardial Infarction (NSTEMI), Unstable Angina] or Ischemic Heart Disease (IHD).

Exclusion criteria:
1. Patients who lost contact with the hospital.
2. Failure to give consent.
3. Patients who recently started taking secondary prevention medications in less than one month.

Tools of the study:
Pretested questionnaire and direct interviews were done. The questionnaire gathered data on patient's age, sex, body weight, level of education, smoking habits, type of jobs, causes of stress, evidence of hyperlipidaemia, diabetes, hypertension, longevity of the disease, number of hospital admissions, life style, period of adherence to the medications in the study namely Aspirin, clopidogrel, Statins, β-Blockers, ACE Inhibitors or (ARBs) and Aldactone .

The questionnaire was pretested with 30 patients to reach a common consensus of understanding to each and every question. The pretested questionnaire was filled by investigator. The "Don't know" option was included to minimize guessing of the response. Most of the patients were Arabic speaking natives; therefore the questionnaire was translated into Arabic language. One questionnaire was allotted for each patient regardless of his/her number of visits to the clinic during the study period.

Data analysis:
Data were fed to Statistical Package of Social Sciences (SPSS) version 18. Means and standard deviations were computed where appropriate. One sample *t* test and correlations were obtained and statistical significant difference was taken at $P = 0.05$.

Ethical clearance:
This study was approved by the Quality and Training Administration at Elshaab Teaching Hospital. All patients were included after reading and signing the informed consent attached to questionnaire.

A pilot questionnaire was administered to 30 patients who were diagnosed as ACS or IHD in order to evaluate their understanding of the questions. This helped in designing the final version. A total 210 patients were included in this study. Patients were selected according to the final diagnosis. Medications taken for control of the disease were obtained.

RESULTS:

The patients were 103(49%) male and 107(51%) female. Their mean (±SD) age was 60.8 (±12.3) years (Table 1).

Table 1: Demographics of the study population

Characteristics	Frequency
Sex	
Male	103(49%)
Female	107 (51%)
Age (Mean ± SD)	60.8 (±12.3)yrs
Educational Level	
Illiterate	61(29 %)
Preschool	31(14.8%)
Basic School	61(29%)
Secondary School	39(18.6%)
University	14(6.7%)
Postgraduate	4(1.9%)

Similar family history obtained from 74(35.2%) patients. Nine (4.3%) patients were smokers at the time of the study, and 67(31.9%) patients were ex-smokers. Also, 23 (11%) snuffers and 17 (8.1%) are ex-snuffers. The distribution of frequencies of co-morbid diseases is seen in table 2.

Patients who were able to perform their routine activities were 178(84.8%). However, 6(2.9%) patients were assisted in their regular activities and 26(12.4%) patients were not able to do any of their daily activities. Regarding exercise, 37(17.6%) patients were on regular programmed exercise, but 173(82.4%) were not practicing any exercise at the time of the study. Pattern of diet control is shown in Table 3.

Table (2): Frequencies of Co-morbid factors in the study population.

Comorbid factor	Frequency (%)
Hypertension	122 (58%)
Diabetes	68 (32.4%)
Hyperlipidemia	67 (31.9%)

Table (3): Diet control among patients on secondary prevention

Diet control	Yes	No	Some times
Strict control	40(19%)	127(60.5%)	43(20.5%)
Only to sugar	58(27.6%)	94(44.8%)	58(27.6%)
Only to fat	139(66.2%)	33(15.7%)	38(18.1%)

The mean (±SD) frequency of admissions and the number of days spent in Hospital were 2.1(±2.5) admissions and 6.3(±4.2) days respectively. There were 23(11%) patients on regular 2-3 weeks, 92(46.2%) on monthly, 52(24.8%) on 2-3 months follow up but 38(18.1%) patients did not come for follow up on regular bases.

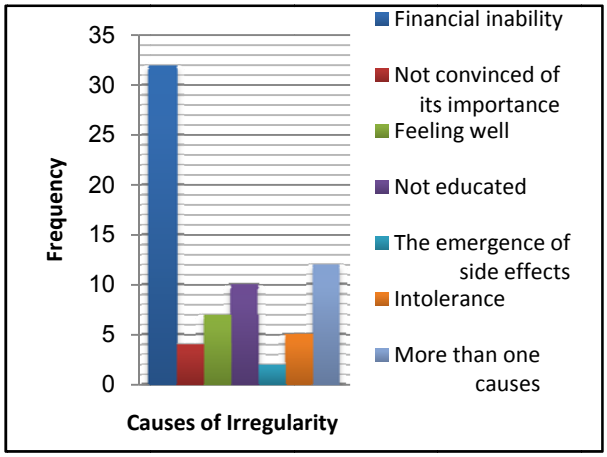

Figure (1): Causes of irregularity on secondary prevention medications.

Out of all 140(66.7%) were strictly adherent to treatment for secondary prevention, 21(10%) were partially not adherent and 49(23.3%) were totally not adherent. Figure1 explains the causes of lack of adherence to the treatment.

DISCUSSION:

This is probably the first study in adherence of Sudanese patients to secondary preventions. In this study, the male to female ratio was 1:1 indicating that CAD in Sudan is equally common in females and males. This is in keeping with the reports from Minnesota - USA[14]. However, in another study females were reported to comprise three quarters of 33,646 patients after their first MI[15].

In our study, we found that the frequency of CAD increases after the age of 45 years to reach a peak at 65 years. This could be explained by the increasing tendency towards arteriosclerosis in this age. However, the lower frequency after the age of 70 in our study is clearly explained by the pyramid of the population census in Sudan. Also, 35(16.7%) of our patients were ≤49 years. This correlates favorably with the international literature where 32.7% of patients with chest pain in young patients were reported to have MI[16].

More than half of our patients have one or more risk factors. Control of these risk factors logically helps controlling the disease. However, persistence of one or more risk factor, like smoking, may increase the rate of myocardial infarction. Patients who adhere to statin after MI have a relative risk of recurrent MI about 81% lower than that of non-adherent patients[17]. Post-MI patients who discontinue their prescribed aspirin, statin, and beta-blocker are more than three times likely to die than patients who remain adherent[8]. Secondary non-adherence has been shown to increase mortality, hospitalizations, and costs of treatment[18-21].

In our study, we have rates of adherence are lower than what was reported by Rasmussen JN et al, who classified patients into one of three groups for each medication, using

standard thresholds[9]. However, our rates od adherence were better than what was reported in another study[14].

The commonest cause of poor adherence to treatment of secondary prevention, in our study, was poverty and poverty plus other causes (patient were either not convinced about the importance of the medications, not well educated about adherence benefits, feeling well, annoyed with side effects, and/or became intolerant to continue on medications). Our findings were consistent with other studies regarding adherence to statin and other secondary prevention medications[22-25].Nevertheless, a study report in Sao Paulo, Brazil concluded that adherence of patients to use of medications was far from satisfactory, mainly due to the high cost of the medications[26].

In this study, we found statistically significant result in the relation between way of obtaining medications and adherence (χ^2 = 8.280 P = 0.013). Our results showed that the commonest way to obtain medications was the health insurance. In spite of the help of the Health Insurance Fund, few insured patients were poorly adherent or completely in-adherent to their medications. Their poor adherence was probably explained by other factors such as being not convinced to importance of medications, not well educated about benefits of adherence, feeling well, annoyed with side effects, and/or intolerance to continue on medications. This is in keeping with findings of other published studies which added more reasons for intentional non-adherence as believing the medications were not needed and perceiving ineffectiveness of therapy, annoyed with the complexity of the regimen, and suffer of inability to afford the medication[27-28]. Also, others had reported that, treatment side-effects, cognitive impairment, poor healthcare provider-patient relationships, and difficulties accessing physicians or pharmacies have all been identified as relevant factors were adding to the problem of poor adherence[25].

In this study we found that, there was significant statistical difference in relation between the follow up period and regularity of intake of medications. Patients who were regular in their follow up were adherent to their medications (χ^2 = 37.373 P = 0.0001). This is consistent with the literature[14].

In this study there were 84(40%) housewives, 56 of them were fully adherent, eight partially adherent and 20 were not adherent at all. In contrast, another study showed statistical significance, in women and nursing home residents been adherent to beta-blockers and ACEI/ARBs but not statins[15].

Also, we found that the level of academic education did not affect the adherence of patients to their drugs (χ^2 = 8.183 P = 0.3790) but probably the severity of the disease, phobia from its bad consequences and the doctors-patient health education play a good role in keeping the majority of patients adherent to their drugs. One of the factors of non-adherence is the inadequate communication between healthcare workers and patients, resulting in the patient's failure of following medical recommendations. This was stated as evident fact in older and semi-illiterate patients[29].

We have small number of smoker patients in our study but, there was no significant statistical difference in patients who were smokers, not smokers or ex-smokers and their adherence (χ^2 = 3.552 P = 0.1450). This finding is similar to the fact mentioned in another study that smoking at the time of myocardial infarction appeared to be associated with an increased likelihood of discontinuing cardio-protective medications[14].

Also, in our data we found that there was significant statistical difference in adherence of patients who had three or less admissions compared to the poor adherence of those who had frequent admissions (χ^2 = 36.663 P= 0.0340). However, there was no significant statistical difference in adherence of patients who were admitted for seven days or more (χ^2 = 27.461 P= 0.9460). This is similar to another study that reported patients who were in the hospital for more than a week were more likely to discontinue therapy compared to those with shorter stays[13].

On the other hand, we found that there was significant statistical difference in adherence

of patients who had early and late diagnosis (χ^2 = 76.0520 *P*= 0.5720). This is consistent with the study that reported rates of adherence among old users of drugs to be significantly higher than those among patients were newly prescribed medications following their MI. However, the trends in adherence for recent and previously diagnosed patients did not differ for ACEI/ARB, beta-blockers, or all the three study medications. In contrast, patients newly prescribed statins after their MI had greater improvements over time than for old statin users (*P*<0.0010)[15].

CONCLUSION:

Males and females in Sudan patients were affected equally by IHD/ACS with a peak frequency at 45-65 years of age. There was no significant statistical difference in their adherence regarding the differences in sex and age. We encountered few smokers and ex-smokers that did not show significant statistical differences regarding their adherence.

Poverty seems to adversely affect adherence. This occurs in spite of the support of the Health Insurance Fund, because some subgroups of medication are not covered by the umbrella of the insurance programme. However, this needs to be tackled carefully and ethically by the policy-makers and health providers within the health economic policies. On the other hand, the level of academic education and the patients' jobs seems to have no impact on adherence to secondary prevention of IHD/ACS medications.The longer the duration of admission adversely affects adherence, but the frequency of readmissions doesn't affect adherence.

Further researches are advised to be done in this area with a larger sample size and longer term follow up, to validate the results of this study.

REFERENCES:

1. Yusuf S, Reddy S, Ounpuu S, et al. Global burden of cardiovascular diseases: Part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. Circulation2001;104:2746–2753.
2. LaBresh KA, Ellrodt AG, Gliklich R, et al. Get with the guidelines for cardiovascular secondary prevention—pilot results. Arch Intern Med. 2004; 164: 203-209.
3. Mehta RH, Montoye CK, Gallogly M, et al. Improving quality of care for acute myocardial infarction—the guidelines applied in practice (GAP) initiative. JAMA2002; 287: 1269-1276.
4. Rogers AM, Ramanath VS, Grzybowski M, et al. The association between guideline-based treatment instructions at the point of discharge and lower 1-year mortality in Medicare patients after acute myocardial infarction: the American College of Cardiology's Guidelines Applied in Practice (GAP) initiative in Michigan. Am Heart J. 2007; 154: 461-469.
5. Bradley EH, Herrin J, Elbel B, et al. Hospital quality for acute myocardial infarction—correlation among process measures and relationship with short-term mortality. JAMA2006; 296:72-78.
6. D'Elia, Lanfranco D, Barba, Gianvincenzo, Cappuccio, Francesco P., et al. Potassium Intake, Stroke, and Cardiovascular Disease: A Meta-Analysis of Prospective Studies. J Am CollCardiol. 2011;57:1210-1219.
7. Antman EM, Hand M, Armstrong PW, et al. Focused Update of the ACC/AHA 2004 Guidelines for the Management of patients with ST-Elevation Myocardial Infarction: a report of the American College of Cardiology/AmericanHeartAssociation Task Force on Practice Guidelines: Circulation2008;117:296–329.
8. Ho PM, Spertus JA, Masoudi FA, et al. Impact of medication therapy discontinuation on mortality after myocardial infarction. Arch Intern Med. 2006; 166: 1842-1847.
9. Rasmussen JN, Chong A, Alter DA. Relationship between adherence to evidence-based pharmacotherapy and long-term mortality after acute myocardial infarction. JAMA2007; 297: 177-186.
10. Choudhry NK, Winkelmayer WC. Medication adherence after myocardial infarction: a long way left to go. J Gen Intern Med 2008;23:216–218.
11. Jackevicius CA, Li P, Tu JV. Prevalence, predictors, and outcomes ofprimary nonadherence after acute myocardial infarction. Circulation2008; 117:1028-1036.
12. Benner JS, Glynn RJ, Mogun H, et al. Long-term persistence in use of statin therapy in elderly patients. JAMA 2002;288:455–461.
13. Akincigil A, Bowblis JR, Levin C, et al. Long-Term Adherence to Evidence Based Secondary Prevention Therapies after Acute Myocardial Infarction. J Gen Intern Med. 2008; 23(2):115-21.
14. Shah ND, DunlaySM, Ting HH, et al. Long-term Medication Adherence after Myocardial Infarction: Experience of a Community. Am J Med 2009; 122(10): 961-7.
15. Choudhry NK., Setoguchi S., Levin R.,et al. Trends in adherence to secondary prevention

medications in elderly post-myocardial infarction patients Pharmacoepidemiol Drug Saf. 2008; 17(12): 1189–1196.
16. Pellaton C, Monney P, Ludman AJ, et al. Clinical features of myocardial infarction and myocarditis in young adults: a reterospective study. BMJ2012;2(6):pii:e001571.doi:10.1136/bmjopen.
17. Wei L, Wang J, Thompson P, et al. Adherence to statin treatment and readmission of patients after myocardial infarction: a six year followup study. Heart2002;88:229–233.
18. Sullivan SD, Kreling DH, Hazlet TK. Noncompliance with medication regimens and subsequent hospitalizations: a literature analysis and cost of hospitalization estimate. J Res Pharm Econ.1990; 2:19 –33.
19. McDermott MM, Schmitt B, Wallner E. Impact of medication nonadherence on coronary heart disease outcomes: a critical review. Arch Intern Med. 1997;157:1921–29.
20. Sokol MC, McGuigan KA, Verbrugge RR, et al. Impact of medication adherence on hospitalisation risk and healthcare cost. Med Care2005;43:521–530.
21. Simpson SH, Eurich DT, Majumdar SR, et al. A meta-analysis of the association between adherence to drug therapy and mortality. BMJ2006;333:18 –26.
22. Goldman L, Weinstein MC, Goldman PA, et al. Cost-effectiveness of HMG-CoA reductase inhibition for primary and secondary prevention of coronary heart disease. JAMA 1991; 265: 1145-51.
23. Troche CJ, Tacke J, Hinzpeter B, et al. Cost-effectiveness of primary and secondary prevention in cardiovascular diseases. Eur Heart J 1998; 19: 59-65.
24. Pickin DM, McCabe CJ, Ramsay LE, et al. Cost effectiveness of HMG-CoA reductase inhibitor (statin) treatment related to the risk of coronary heart disease and cost of drug treatment. Heart 1999; 82: 325-32.
25. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med 2005;353:487–497.
26. Mansur AP, Mattar APL, Tsubo CE, et al. Prescription and Adherence to Statins of Patients with Coronary Artery Disease and Hypercholesterolemia. Arq Bras Cardiol,2001;76: 115-8, 2001.
27. Burke LE, Ockene IS. Compliance in Healthcare and Research. Armonk, NY: Futura Publishing Co Inc; 2001.
28. Rollnick S, Mason P, Butler C. Health Behavior Change: A Guide for Practitioners. New York, NY: Churchill Livingstone; 1999.
29. Morrow D, Leirer V, Sheikh J. Adherence and medication instructions. Review and recommendations. J Am GeriatrSoc 1988; 36: 1147-60.