Assessment of quality of life and prevalence of readmission in patients with myocardial infarction

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Background
Cardiovascular diseases have been responsible for one-fifth of all deaths in India over the last decade. The overall purpose of this research was to study patients who have had a myocardial infarction (MI) and their subsequent readmission rate. The study focused on understanding the quality of life of patients with MI, the adverse effects of drugs used in MI, and the compliance of patients with their medication. Patient counselling was given by clinical pharmacists regarding the importance of medication adherence and nonpharmacological therapy such as diet and exercise in the management of MI. The study showed that patient counselling can significantly improve medication adherence and, thereby, quality of life in patients with MI.

Objectives
To assess the quality of life and prevalence of readmission among patients with MI, to monitor the adverse drug reactions (ADR) and its management, and to study the effect of patient counselling initiated by clinical pharmacists on medication adherence and knowledge of the patients in a tertiary care hospital.

Patients and methods
A total of 61 patients with MI were subjected to Morisky medication adherence scale 8-item questionnaire to measure medication adherence, modified Hartwig's Siegel assessment scale to measure the severity of ADR, and the WHO-UPSALA evaluation scale to identify causality. The short form 36 questionnaire was used to assess the quality of life.

Results and conclusion
According to the study, 14 ADRs were observed. Patients who have experienced chronic MI had a far greater readmission rate. People who experienced a MI had a lower quality of life. The findings in this study revealed that patient counselling was able to enhance patient understanding and medication adherence. This contributes to the development of a positive professional relationship between the pharmacist and the patient. Better understanding of disease and medication can improve health and quality of life of patients.

Keywords:
acute myocardial infarction, adverse drug reactions, cardiovascular diseases, left ventricular hypertrophy

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Introduction

Myocardial infarction (MI) is a condition in which the heart muscle dies owing to an insufficient supply of oxygen (ischemia) [1], http://www.emedicine.medscape.com/article/155919-overview. It is most often caused by atherosclerotic plaque rupture with thrombus formation in an epicardial coronary artery resulting in reduced blood supply to that portion of myocardium. The complete blockage of coronary artery owing to atherosclerotic plaque rupture is the underlying mechanism of acute MI. The patient is very likely to develop atherosclerosis, especially if he or she has other risk factors for atherosclerosis like diabetes mellitus, hypertension, dyslipidemia, cigarette smoking, alcoholism, and family history of hypercholesterolemia [2]. The accumulation of cholesterol deposits occurs in the artery walls over time and leads to the creation of atherosclerotic plaque. Men have a substantially increased likelihood of developing an acute MI than women [3,4]. ST-segment elevation MI results from complete and prolonged occlusion of an epicardial coronary blood vessel and is defined based on ECG criteria. A non-ST-segment elevation MI usually results from severe coronary artery narrowing, transient occlusion, or microembolization of thrombus or atheromatous material [5]. Approximately one-third of all the

patients with MI have left ventricular hypertrophy. However, the causal relationship between left ventricular hypertrophy and MI is not known. Angina pectoris is considered as a symptom of an ischemic heart disease episode [6].

Non-ST-segment elevation MI or ST-segment elevation MI can occasionally produce an acute MI. There can be various reasons for having a MI. They could be related to a previous injury to the coronary arteries or they could be caused by embolization of the coronary arteries or rupture of the aorta, confirming coronary artery involvement [7]. Patients with a MI experience chest, jaw, neck, or arm pain; chest pressure; and breathlessness [8,9]. MI is diagnosed with the help of troponin and creatine kinase-MB. The levels of troponin in blood will be elevated within 2–4 h after MI, and peak levels are reached within 10–24 h. The level will go back to its normal value after 5–10 days. Creatine kinase-MB will raise within 4–6 h after onset of infarction and obtain a peak value in about 12 h. It returns to its baseline within 24–36 h [10]. As a cardiac biomarker, troponin levels are now considered to be more accurate than previously thought [11].

Patients and methods

This study assessed the quality of life and prevalence of readmission in patients with MI and the benefits of clinical pharmacist-initiated measures in patient adherence and therapy management. Ethical Approval Number: LH/EC/2019-39 dated 07/11/2019. Lourdes Hospital Ernakulam Kochi Kerala India. Additionally, various adverse drug reaction (ADRs) observed in patients were evaluated and their management was studied. This interventional study was performed at a Tertiary Care Hospital in Cochin, Kerala, India. A 6-month study was undertaken, during which data collection was done. Pertinent data, including demographic details, necessary laboratory tests with treatment details, and social history, were obtained with direct interview of patients and with the help of their medical charts. A total of 61 patients were evaluated in the study. The trial participants included all those who met the inclusion criteria. The study period was from November 2019 to April 2020. Informed consent was obtained from patients before the initial interview. A data collection form was devised for obtaining important laboratory and therapy information as well as demographic and social history information [12,13]. The first baseline information for the patients on their disease condition and therapy was evaluated by using a validated knowledge, attitude, and practice questionnaire, which was scored separately. Medication adherence evaluation was done with the Morisky medication adherence scale 8-item questionnaire (Ref: http://psnc.org.uk 2016/12 questionnaires) ADR findings and management were properly recorded. To measure the severity of ADR, the Modified Hartwig's and Siegel severity rating scale (Ref: American Journal of Hospital Pharmacy, 1992 September 49 (9) 2229 2232) and the WHO-UPSALA causality assessment scale (Ref: https://www.who.int/medicines/areas/quality_safetyefficacy/WHOcasuality_assessment.pdf) were employed. The prevalence of readmission was evaluated using 6-month data. A short form 36 survey was conducted to assess the quality of life of all patients. (Ref: https://clinmedjournals.org/articles/jmdt/jmdt-2-023-figure-1figure-1.pdf). Clinical pharmacists began a patient counselling program to help patients cope with various aspects of their illness, medications, and dietary habits. Returning patients were administered the same questionnaire, and their adherence was again assessed. A preclinical and postclinical pharmacist-initiated counselling survey was carried out to assess the knowledge of patients and medication adherence before and after receiving counselling [14–20]. After the procedure, follow-up was conducted over the telephone and (or) in person.

Inclusion criteria

Patients of either sex aged 18 years or older who have ever had a MI or an acute MI were included.

Exclusion criteria

Patients who have a mental disease, pregnant and breastfeeding women, patients who have been diagnosed with severe metastatic diseases, and all those who are confined to bed were excluded.

Descriptive statistics

The collected data were analyzed using Microsoft Excel and represented in a graphical format using bar graphs. The mean and SD were calculated using statistical calculators. Data analysis was carried out using the statistical software SPSS (SPSS version 20 by IBM 233 South Wacker Drive, 11th Floor, Chicago, Illinois, USA). The paired sample *t* test was employed to determine the significance of the study results.

Results and discussions

Demographic information

A total of 61 patients who satisfied the inclusion and exclusion criteria were included in the study. The occurrence of MI was highest in the age group 51–70 years (57.37%) followed by above 70 years

(27.86%) and least in the age group 31–50 years (14.75%). A total of 61 patients were enrolled in the study, comprising 37 (60.65%) male patients and 24 (39.34%) female patients. This study showed that males had a higher risk of heart attack than females. The conclusions drawn from this study also revealed that males had a higher risk of heart attack as they age, whereas sex-specific risk factors diminish with age. The data are shown in Table 1.

Social history

Overall, 43.47% of the study population, who were not either smokers or alcoholics, were exposed to MI, as most of the study population belonged to chronic MI with comorbid conditions. Moreover, 34.78% of the sample population included smokers and 30.43% alcoholics. Table 2 illustrates the relationship between social history and MI. From this, we may conclude that apart from smoking and alcohol, other comorbidities such as hypertension and hypothyroidism may also contribute as risk factors for MI.

Comorbidities

Of the 61 patients, approximately 47.82% had hypertension as a comorbidity, 39.13% had diabetes, 28.26% had chronic obstructive pulmonary disease, 8.60% had hypothyroidism, and 6.52% had dyslipidemia. Hence, hypertension was seen as a major risk factor followed by diabetes for MI. The data are given in Table 2.

Table 1 Demographic distribution of sample population

Age wise distribution		
Age (years)	Frequency	Percentage
31–50	9	14.7540
51–70	35	57.3770
>70	17	27.8688
Sex distribution		
Female	24	39.3442
Male	37	60.6557

Table 2 Social history and comorbidities

Social history	
	Percentage
Habit	
Nonsmokers/nonalcoholic	43.47
Smoking	34.78
Alcoholic	30.43
Comorbidities	
Diabetes mellitus	39.13
Hypertension	47.82
Dyslipidemia	28.26
COPD	8.60
Hypothyroidism	6.52

COPD, chronic obstructive pulmonary disease.

Quality of life

The quality of life was studied using short form 36 questionnaire. The domain with the lowest quality of life was limitation due to physical health (34.67%) followed by limitation due to emotional problem (42.13%), general health (43.27%), full (43.57%), energy or fatigue (43.93%), physical functioning (47.28%), social functioning (47.34%), emotional wellbeing (48.17%), and the least in the domain was pain (49.90%). The findings are tabulated in Table 3.

Readmission rate

Of 61 patients, 34 (55.73%) patients were readmitted. The causes of readmission were classified into cardiovascular and noncardiovascular. Chest pain accounted for nearly 50% of the cardiovascular cause. Of 18 acute MI cases, eight (44.45%) were readmitted, and of 43 chronic MI cases, 26 (60.45%) were readmitted. Among 18 patients with acute MI, the majority of patients were readmitted within 30 days of discharge. This can be related to another study done by Wang *et al.* [20] titled 'The prevalence of 30-day readmission after acute myocardial infarction: a systematic review and meta-analysis,' which also found that the reasons for 30-day readmission after acute MI mainly come from cardiovascular and noncardiovascular causes. The results of readmission are given in Table 4.

Adverse drug reactions in sample population

A total of nine probable and five possible ADRs were seen according to the WHO-UPSALA scale, in which hematuria, hematoma, and thrombocytopenia accounted for 64.2% of all ADRs. Of these ADRs, 11 were categorized as mild and three of the total number were moderate ADRs based on the Hartwig's severity assessment scale. In the case of unfractionated heparin-induced (UFH) and enoxaparin-induced hematuria, if gross hematuria does not occur, the management adopted was reducing the dose or discontinuation of the drug. Protamine sulfate was, in some situations, used as an antidote. If gross

Table 3 Quality-of-life domains

Domains	Percentage
Physical functioning	47.28
Limitation to physical health	34.67
Limitation due to emotional problem	42.13
Energy or fatigue	43.93
Emotional wellbeing	48.17
Social functioning	47.34
Pain	49.90
General health	43.27
Full	43.57

hematuria was present, discontinuation of the UFH/enoxaparin in addition to other antiplatelet medications was done. Patients who develop thrombocytopenia in addition to hematuria and high activated partial thromboplastin time levels had their UFH stopped and then a different drug like fondaparinux was administered. To correct blood potassium levels under 3.5 mEq/l, an intravenous injection of potassium chloride was administered. Nontreatable mild to moderate hyponatremia was left untreated because a regimen of food supplements was all that was required to correct it. The nitrate-induced headache was treated by discontinuing the medication. ADR observed in the study population is reported in Table 5.

Statistical analysis of medication adherence

The pretest medication adherence level was 5.61 ±1.942, which was improved to 7.24±0.885 in the posttest result. The mean change in medication adherence was 1.632, which was found to be significant, with *P* value less than 0.001. This shows that patient counselling has a significant effect on medication adherence.

In our study, we observed that there was low adherence at the baseline level among patients and there was improved adherence after counselling and follow-up. The baseline adherence showed that 52.17% of patients had low adherence, 30.43% of the patients were in the medium adherence category, and only 17.39% were in the high adherence category. The follow-up result was 8.6% with low adherence, 50% with medium adherence, and 41.3% with high adherence. This showed a significant increase in the adherence level of the study population. This is expressed in Table 6.

Statistical analysis of knowledge attitude and practice

The pretest knowledge level was 6.61±2.289, which was improved to 10.07±1.493 in the posttest result. The mean change in the knowledge was 3.902, which was found to be significant, with *P* value less than 0.001. Thus, there is a statistically significant improvement in knowledge among patients with MI. The findings support the conclusion that patient counselling has a substantial effect on patient knowledge. The outcomes of knowledge, attitude, and practice analysis are presented in Table 7.

The pretest attitude level was 2.87±2.269, which was improved to 4.05±2.187 in the posttest result. The

Table 4 Rate of readmission

Type	Total number of patients	Number of patients readmitted
Acute	18	8
Chronic	43	26
Total	61	34

Table 5 Adverse drug reactions observed in the sample population

Drug	ADR	Number of people affected
UFH/ enoxaparin	Hematuria, hematoma, thrombocytopenia	9
Furosemide	Hypokalemia	2
Telmisartan	Increased creatine level	2
Nitrates	Headache and dizziness	1

ADR, adverse drug reaction; UFH, unfractionated heparin.

Table 6 Mean, SD, and *t* value to compare medication adherence

Mean, SD, and *t* value to compare pretest and posttest levels of medication adherence							
Test	Mean	SD	*N*	Difference between mean	*t* value	DF	Significance (*P* value)
MMAS-8 before follow-up	5.61	1.942	46	1.632	7.629	61	<0.001
MMAS-8 after follow-up	7.24	0.885					

MMAS-8, Morisky medication adherence scale 8-item questionnaire.

Table 7 Mean, SD, and *t* value to compare knowledge, attitude, and practice

Mean, SD, and *t* value to compare pretest and posttest levels of knowledge							
Test	Mean	SD	*N*	Difference between mean	*t* value	DF	Significance (*P* value)
Pretest knowledge assessment scale	6.61	2.829	61	3.902	14.770	61	<0.001
Posttest knowledge assessment scale	10.07	1.493					
Mean, SD, and *t* value to compare pretest and posttest levels of attitude							
Pretest attitude assessment scale	2.87	2.269	61	1.180	4.803	61	<0.001
Posttest attitude assessment scale	4.05	2.187					
Mean, SD, and *t* value to compare pretest and posttest levels of practice							
Pretest practice assessment scale	4.61	1.615	61	1.164	5.459	61	<0.001
Posttest practice assessment scale	5.77	0.424					
Pretest practice assessment scale	4.61	1.615					

mean change in attitude was 1.180, which was found to be significant, with *P* value less than 0.001. In other words, the study findings show that patient counselling has a major effect on patients' attitudes toward their illness.

The pretest practice level was 4.61±1.615, which improved to 5.77±0.424 in the posttest result. The mean change in the attitude was 1.164, which was found to be significant, with *P* value less than 0.001. Hence, we can conclude that there was a positive effect of patient counselling on all of the parameters of knowledge, attitude, and practice questionnaire. This proved the effect of patient counselling on practice.

Conclusion

The present study was done to assess the quality of life and prevalence of readmission among patients with MI, monitoring ADR, its management, and studying the effect of clinical pharmacist-initiated patient counselling on medication adherence and knowledge of patients in a tertiary care hospital. The ADRs which occurred in the patients and their management were also evaluated. Hematuria was the most common type of ADR in which the medication was withheld or antidote administered. The findings in this study revealed that patient counselling was able to enhance patient understanding and medication adherence. It enabled a good patient-clinical pharmacist relationship. Thus, improved knowledge about diseases and medication can help enhance the health and quality of life of patients with MI [13].

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Conflicts of interest

There are no conflicts of interest.

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