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Improvement of secondary prevention of acute coronary syndrome

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Abstract---Regular usage and correct administration of secondary prevention drugs for acute coronary syndrome increase the quality of life and survival by up to 80%. This study was conducted to assess the effect of pharmacist educational intervention in improving the adherence of the physicians to guideline-recommended secondary intervention therapy for secondary prevention of acute coronary syndrome and evaluate the clinical benefit of this intervention. A prospective interventional study was conducted in Iraq, Al-Muthanna Governorate, Al-Hussein Teaching Hospital during the period from October 2021 to March 2022. A convenient sampling method was adapted to enrol the participants in the current study which included two groups including the intervention and control group. In the intervention group, the researcher sought to use an educational program, mediated by clinical pharmacists, to improve physician adherence to secondary prevention of acute coronary syndrome in hospitalized patients at discharge. There was no significant difference between the study groups at the first visit after discharge regarding the prescription of aspirin, ACEI, B blocker, or clopidogrel/ticagrelor while there was a significant difference at the end of follow up. There was a significant difference between the study groups regarding lipid profile at the end of follow up, the better improvement was in the intervention group. In conclusion, the pharmacist intervention resulted in a significant improvement in the physician's adherence to the recommended secondary prevention with subsequent a significant difference in the level of lipid between the study groups at the end of the study.

Keywords---ACS, secondary prevention, Iraq.

Introduction

The term "acute coronary syndrome" refers to both unstable angina and myocardial infarction(MI)(1). Unstable angina is defined by new-onset or rapidly worsening angina (crescendo angina), angina with minimal exercise, or angina at rest in the absence of cardiac injury(2). Clinically, MI is defined by the presence of acute myocardial injury, it includes ST-elevation MI (STEMI) and non ST-elevation MI (NSTEMI)(3). STEMI is characterized by severe and/or total coronary flow obstruction with transmural ischemia, which predisposes to myocardial necrosis and pump dysfunction, whereas NSTEMI is characterized by flow-limiting coronary stenosis with downstream myocardial ischemia, which predisposes to myocardial necrosis and pumps dysfunction(4). According to a world health organization study in 2017, death from coronary artery disease (CAD) in Iraq reached about 18.5% of total deaths. The CAD mainly presented as either chronic stable angina or ACS(5). In 2019, another study done in Iraq revealed that CAD is the main cause of hospitalizations and accounts for 33% of total deaths(6).

In absolute terms, patients with an ACS have a 20% higher 5-year risk of recurrent ischemic episodes than people without coronary heart disease(7). The act of preventing or impeding is divided into four stages: primordial, primary, secondary, and tertiary. Secondary prevention emphasizes early disease detection and targets healthy-appearing individuals with subclinical forms of the disease(8, 9). The administration of secondary preventive drugs on a regular basis and at the correct dose improves the quality of life and survival, reducing cardiovascular events, and mortality by up to 80%. Therefore, the American Heart Association/American College of Cardiology (AHA/ACC) guidelines, which are used as national guidance in Iraq, recommend prescribing secondary prevention medications before discharge to all patients without contraindications(10).

The AHA/ACC guidelines group the patients according to their risk (high risk and very high risk). Very high risk comprises a history of multiple major Atherosclerotic Cardiovascular Disease (ASCVD) events including recent acute coronary syndrome within the past 12 months, a history of myocardial infarction other than the recent acute coronary syndrome event, a history of ischemic stroke, and symptomatic peripheral arterial disease (defined as a history of claudication with ankle-brachial index <0.85 or previous revascularization or amputation)(11), or 1 major ASCVD event and multiple high-risk conditions (age ≥ 65 , heterozygous familial hypercholesterolemia, history of coronary artery bypass surgery or percutaneous coronary intervention, diabetes mellitus, hypertension, chronic kidney disease, current smoking, persistently elevated low-density lipoprotein-C (LDL-C) or history of heart failure)(12).

Secondary prevention treatments, including behavioural advice (diet, exercise and smoking cessation) and cardioprotective medications (aspirin or other antiplatelet, beta-blockers, statins, angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers), are effective in reducing the risk of repeat ischaemic events in ACS(7). Adherence to prescribed medications predicts results, and better outcomes result in lower healthcare expenses. According to current estimates, statin nonadherence costs the US \$44 billion in additional yet avoidable health care costs(13). New recommendations are released on a regular basis, although

adoption and execution are not always guaranteed. Adherence to guidelines frequently necessitates the development of specialized information and skills, educational interventions, and procedures to make these suggestions easier to implement in daily practice. Physicians must be aware of the guidelines and consciously elect to embrace them in their clinical practice, as well as adhere to the recommendations when clinically appropriate, for patient treatment to be in compliance with guideline recommendations(14). Particularly in this high-risk patient population, physician and patient education on the need of adhering to guideline-recommended lipid-lowering treatment should be emphasized(15). Pharmacists are in a unique position to deal with patients more regularly than other healthcare professionals. By using their access to prescription refill information, pharmacists are better able to emphasize good medication-taking behaviors and address concerns with the patient's medication adherence. Additional motivation for patients can be offered by enlisting ancillary health care providers such as pharmacists(13).

Aim of the study

Assessment of the effect of pharmacist educational intervention in improving the adherence of the physicians to guideline-recommended secondary intervention therapy for secondary prevention of ACS and evaluation of the clinical benefit of this intervention.

Patients and Methods

Study design and setting

A prospective interventional study was conducted in Iraq, Al-Muthanna Governorate, Al-Hussein Teaching Hospital during the period from October 2021 to March 2022.

Ethical consideration

This study was proposed and consequently approved by the Ethics and Scientific Committee of the Faculty of the Pharmacy/ University of Kufa and the Scientific Committee of Researches of AnNajaf Health Directorate. Fully informed consent was obtained from the patients verbally after explaining the aim of the study thoroughly and clearly. All the information and questions were communicated to the patients with honesty and transparency objectively to avoid bias as much as possible.

Study population

Sampling method and inclusion criteria

A convenient sampling method was adapted to enrol the participants in the current study which included two groups.

- Group A: A total of 150 patients who were diagnosed with ACS (STEMI, NSTEMI, or UA) were selected, 39 of them were excluded due to loss of

follow up. The participants in this group were followed for two months before the intervention.

- Group B: A total of 134 patients who were diagnosed with ACS (STEMI, NSTEMI, or UA) were matched with the participants in group B regarding the age, gender, residency, education, employment, body mass index (BMI), and diagnosis were selected.

The selection was done before the intervention and the follow up was done two months after the intervention. During follow up, 17 participants were excluded due to loss of follow up. Then six participants were excluded to have a total number of 111.

Exclusion criteria

- Patients were excluded if they have a contraindication to use any drug for the secondary prevention of acute coronary
- Patients who refused to participate in the current study.

Data collection

The researcher collected the data of the enrolled patients by using a structured questionnaire through direct interviews and examination. The questionnaire was prepared by the researcher after reviewing similar articles with revision of the supervisor, it included closed-ended questions and was divided into two sections: Section A: It included the data of enrolled patients at the time of discharge from the hospital before intervention and is composed of four parts:

- Part one: Sociodemographic characteristics of the participants including age, gender, residency, occupation, and smoking state.
- Part two: It included the medical history, surgical history, and drug history.
- Part three: It included the information about the present disease which contained the diagnosis, prescribed drugs by the physician, and the results of the laboratory investigations.
- Section B: It contained the prescribed drugs by the physician at the first follow up visit after discharge in group A and after the first visit after intervention in group B. In addition to the results of the laboratory investigations that were done 2 months after the first follow up visit.

Intervention

In this study, the researcher sought to use an educational program, mediated by clinical pharmacists, to improve physician adherence to secondary prevention of acute coronary syndrome in hospitalized patients at discharge. The intervention was done through many activities including:

- A scientific lecture was prepared by the researcher depending on the "ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults" and delivered in the presence

of the specialist doctors in the selected hospital, with an open discussion between the specialists, and between them and the researcher.

- Organizing indicative posters and placing them in specific clear places.
- Organizing brochures including a summary of statin drugs guidelines and distributing them to specialists.

Statistical Analysis

Microsoft Excel 2019 and software package of social science (SPSS) version 22 was used for data entry and analysis. The descriptive analysis focused on frequencies and percentages. Continuous variables were presented as mean ($\pm$ Standard Deviation (SD)) and were compared by using the paired t-test. Categorical data were presented as proportions and the chi-square test was used to measure the statistical difference between the two proportions. A P-value of less than 0.05 will be considered statistically significant.

Definition of variables

The weight and height were measured and accordingly, the BMI was calculated according to the formula:

$$\text{BMI} = \text{weight (Kg)} / (\text{height (m)})^2(16)$$

Results

A total of 222 patients were enrolled in the current study. There were no significant differences between the study groups regarding gender, age, residency, education, and employment (Table 3.1).

Table 3.1
Sociodemographic characteristics of the participants (N=222)

Characteristics		Group A N=111	Group B N=111	P-value
		N (%)	N (%)	
Gender	Female	28 (26.7)	27 (26.5)	0.975
	Male	77 (73.3)	75 (73.5)	
Age group	≤ 40	6 (5.4)	8 (7.2)	0.775
	41-50	22 (19.8)	20 (18.0)	
	51-60	34 (30.6)	37 (33.3)	
	61-70	35 (31.5)	28 (25.2)	
	≥ 71	14 (12.6)	18 (16.2)	
Residency	Rural	64 (57.7)	60 (54.1)	0.589
	Urban	47 (42.3)	51 (45.9)	
Education	Primary school	50 (45.0)	55 (49.5)	0.796
	Secondary school	52 (46.8)	48 (43.2)	
	Collage or higher	9 (8.1)	8 (7.2)	
Employment	Unemployed	72 (64.9)	64 (57.7)	0.530
	Employer	36 (32.4)	44 (39.6)	
	Retired	3 (2.7)	3 (2.7)	

Smoking	Yes	27 (24.3)	35 (31.5)	0.231
	No	84 (75.7)	76 (68.5)	

No significant difference was obtained between the study groups regarding the BMI, history of chronic disease, and current diagnosis (Table 3.2) and (Figure 3.1).

Table 3.2
Distribution of the body mass index, medical history, and diagnosis according to the study groups

Characteristics				
		N (%)	N (%)	P-value
Body Mass Index (kg/m ²)	Underweight	0 (0.0)	0 (0.0)	0.521
	Normal weight	27 (24.3)	28 (25.2)	
	Over weight	67 (60.4)	60 (54.1)	
	Obese	17 (15.3)	23 (20.7)	
Chronic disease	Yes	74 (66.7)	82 (73.9)	0.240
	No	37 (33.3)	29 (26.1)	
Diagnosis	Unstable angina	20 (18.0)	23 (20.7)	0.528
	NSTEMI	48 (43.2)	53 (47.7)	
	STEMI	43 (38.7)	35 (31.5)	

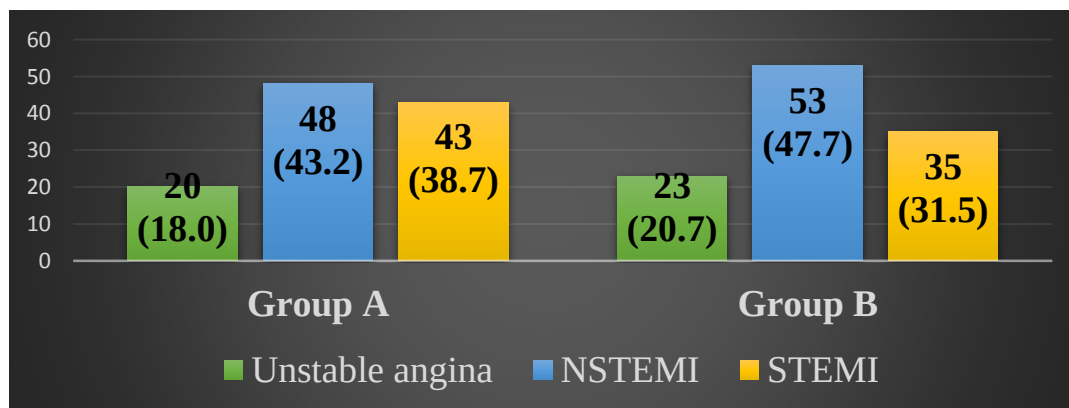


Figure 3.1. Distribution of the participants according to the diagnosis

There was no significant difference between the study groups at the first visit after discharge in group A and after intervention in group B regarding the prescription of aspirin, ACEI, B blocker, clopidogrel/ticagrelor while there was a significant difference at the end of follow up (Table 3.3).

Table 3.3
Prescribed treatment before and after the intervention

Treatments		Group A	Group B	P-value
		N=111	N=111	
		N (%)	N (%)	
At the beginning				
Statin	Yes	103 (92.8)	104 (93.7)	0.789
	No	8 (7.2)	7 (6.3)	
Aspirin	Yes	103 (92.8)	100 (90.1)	0.472
	No	8 (7.2)	11 (9.9)	
ACEI	Yes	97 (87.4)	90 (81.1)	0.197
	No	14 (12.6)	21 (18.9)	
B-blocker	Yes	98 (88.3)	100 (90.1)	0.666
	No	13 (11.7)	11 (9.9)	
Clopidogrel/ Ticagrelor	Yes	94 (84.7)	97 (87.4)	0.561
	No	17 (15.3)	14 (12.6)	
After the intervention in the group B				
Statin	Yes	107 (96.4)	111 (100.0)	0.043
	No	4 (3.6)	0 (0.0)	
Aspirin	Yes	105 (94.6)	111 (100.0)	0.013
	No	6 (5.4)	0 (0.0)	
ACEI	Yes	104 (93.7)	110 (99.1)	0.031
	No	7 (6.3)	1 (0.9)	
B-blocker	Yes	102 (91.9)	111 (100.0)	0.002
	No		0 (0.0)	
Clopidogrel/ Ticagrelor	Yes	103 (92.8)	110 (99.1)	0.017
	No	8 (7.2)	1 (0.9)	

There was a significant difference between the study groups regarding triglyceride, cholesterol, LDL, and HDL at the end of follow up, the better improvement was in group B (Table 3.4).

Table 3.4
Lipids distribution according to the study groups before and after the intervention

Lipid profile	Group A N=111	Group B N=111	P-value
	Mean (SD)	Mean (SD)	
At the beginning			
Triglyceride	191.32 (7.2)	189.98 (5.1)	0.113
Cholesterol	205.17 (6.4)	203.47 (6.5)	0.051
LDL	104.02 (8.1)	101.79 (9.8)	0.067
HDL	45.02 (7.5)	46.95 (8.3)	0.072
After the intervention in the group B			
Triglyceride	185.54 (7.8)	183.06 (6.1)	0.009
Cholesterol	181.58 (7.3)	170.94 (17.6)	<0.001
LDL	95.66 (11.1)	92.81 (8.3)	0.041

HDL	48.02 (8.3)	49.04 (6.9)	0.319
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Discussion

The first finding of the current study was that males constituted more than half of the sample. Although classic CVD risk factors are the same in men and women, there are variances in the prevalence and impact of these risk variables. This is especially true in ACS because women with ACS are typically older and have more comorbidities, such as hypertension, dyslipidemia, diabetes, heart failure, and atrial fibrillation(17). Another finding was more than half of the patients were with an age of more than 50 years. In comparison, another study postulated that Cardiovascular disease is very common among the elderly. Patients aged 75 years old and up account for one-third of those admitted to hospitals with acute ischemia episodes and more than half of all cardiac deaths. One of the most important risk indicators in patients admitted with NSTEMI has been age(18). In agreement with these findings, Alexandre et obtained several gender-related differences in patients with ACS regarding the demographic characteristics, coronary artery disease pattern and applied treatment(19).

About one-third of patients in the current study was a smoker. In comparison, about 41% of patients were a current smokers in another study that was done in Portugal(20). In Sri Lanka, Smoking was found in 55.8% of STEMI patients, 39.8% of UA patients, and 35.5% of NSTEMI patients, demonstrating a strong link between smoking and STEMI(21). Regarding the BMI, more than half of the patients in the current study were overweight or obese. The same findings were obtained by another study that postulated that the mean BMI of the patients were higher than the controls(22). An important finding of the current study was that statin was prescribed to 92.8 of the patients in the intervention group and 93.7% in the control group. In addition, not all the patients received the AHA/ACC guidelines recommended drugs for secondary prevention of ACS. There was an insignificant difference between the study groups regarding in contrast to a significant difference at the end of the study as nearly all patients received the optimal treatment in the intervention group. In addition, after the intervention, a significant improvement in the lipid profile of the patients in the intervention group compared to an insignificant improvement in the control group. In comparison, according to another study, 474 individuals (90.6%) were prescribed statins at discharge. throughout the 6-month follow, 50 (9.5%) individuals dead. Patients not taking statins had a trend toward greater mortality(23).

Conclusion

The pharmacist intervention resulted in a significant improvement in the physician's adherence to the recommended secondary prevention of the ACS with subsequent a significant difference in the level of lipid between the study groups at the end of the study.

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