

Original Article

Medication adherence after myocardial infarction: A single center retrospective cohort study

Miyokard infarktüsü sonrası ilaç uyumu: Tek merkezli retrospektif kohort çalışması

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Abstract

Aim: The study is designed to compare the discharge prescriptions of ST-elevated (STEMI) and non ST-elevated (NSTEMI) myocardial infarction patients and the medications used end of first year and also to investigate the relationship between MI type, gender, age groups and drug adherence.

Material and Methods: In retrospect, data from 413 patients were collected via epicrisis and phone visits. Discharge and the outpatient medications end of one year were compared.

Results: Of the 413 patients included in the study, 312 (75%) were male. MI type distribution was NSTEMI with a ratio of 38.5% (n = 159) and STEMI with a ratio of 61.5% (n = 254). Only 2 (0.5%) patients did not receive acetylsalicylic acid (ASA) at discharge. The rate of beta-blocker, statin, clopidogrel users were %94.4, %97.1 and %97.8, respectively. The rate of patients who used five drugs (ASA, beta blocker, ACEI/ARB, statin, clopidogrel) at discharge was 78.7% (n = 325). At the end of first year, the rate of ASA, statin, beta blocker, angiotensin converting enzyme inhibitors/aldosterone receptor blocker(ACEI/ARB) and clopidogrel users dropped down to 88.1% (n = 364), 66% (n = 273), 80.9% (n = 334), 69.7% (n = 288) and 81.3% (n = 336), respectively(p<0.05 for all parameters). After one year, the number of patients using five drugs dropped to %45(p<0.05). Beta-blocker target dose was achieved in 68(16.5%) patients and ACEI / ARB target dose was achieved in 74(17.9%) patients. Patients with renal failure were not able to reach the target doses of ACEI/ARB at the end of first year (p: 0,033). And also renal failure is considered as an impediment to proper drug use at discharge and end of the first year (p <0.01 and p<0.01 respectively).

Conclusion: It was determined that treatment compliance was impaired at the end of one year in a significant proportion of patients with acute coronary syndrome. One year later, compliance with treatment was higher in females than in males and was inversely related to age and renal failure. It is observed that follow-up training programs are needed to succeed in drug adherence.

Keywords: acute coronary syndrome; therapeutic adherence; maximal tolerated dose

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Öz

Amaç: Çalışma, ST yükselmeli (STEMI) ve ST yükselmez (NSTEMI) miyokard infarktüsü hastaların taburculuk reçetelerini ve birinci yıl sonundaki kullanılan ilaçlarını karşılaştırmak ve ayrıca bunların MI tipi ile cinsiyet, yaş arasındaki ilişkisini araştırmak için tasarlanmıştır.

Gereç ve Yöntemler: Retrospektif olarak 413 hastanın verileri epikriz ve telefon ziyaretleri yoluyla toplandı. Taburculuk ve bir yıl sonunda kullanılan ilaçları karşılaştırıldı.

Bulgular: Çalışmaya dahil edilen 413 hastanın 312'si (% 75) erkekti. MI tipi dağılımı % 38.5 (n=159) NSTEMI, % 61.5 (n=254) STEMI'di. Sadece 2 (% 0.5) hasta taburcu olduklarında asetilsalisilik asit (ASA) almadı. Beta-bloker, statin, klopidogrel kullanıcılarının oranı sırasıyla % 94.4, % 97.1 ve % 97.8'di. Taburculukta beşli ilaç (ASA, beta bloker, ADEİ / ARB, statin, klopidogrel) kullanan hastaların oranı % 78.7'di (n=325). İlk yılın sonunda, ASA, statin, beta bloker, anjiyotensin dönüştürücü enzim inhibitörleri / aldosteron reseptör bloker (ADEİ / ARB) ve klopidogrel kullananların oranı sırasıyla; % 88.1'e (n=364), % 66'ya (n=273), % 80.9'a (n = 334), % 69.7'ye (n=288) ve % 81.3'e düştü (n=336) (tüm parametreler için p <0.05). Bir yıl sonra, beşli ilaç kullanan hasta sayısı % 45'e düştü (p <0.05). 68 hastada (% 16.5) beta blokör hedef dozu, 74 hastada (% 17.9) ADEİ / ARB hedef dozu sağlandı. Böbrek yetmezliği olan hastalar birinci yıl sonunda ADEİ / ARB hedef dozlarına ulaşamadı (p: 0,033). Ayrıca böbrek yetmezliğinin taburculuk sırasında ve ilk yılın sonunda uygun ilaç kullanımına engel olduğu gözlemlendi (sırasıyla p <0.01 ve p <0.01).

Sonuç: Akut koroner sendromlu hastaların önemli bir bölümünde tedavi uyumu bir yıl sonunda bozulmuş bulundu. Bir yıl sonra, tedaviye uyum kadınlarda erkeklere göre daha yüksekti, yaş ve böbrek yetmezliği ile ters orantılıydı. İlaç uyumunda başarılı olmak için takip eğitim programlarına ihtiyaç duyulduğu gözlemlendi.

Anahtar kelimeler: akut koroner sendrom; terapötik uyum; maksimal tolere edilen doz

Introduction

In patients with CAD (coronary artery disease), patients with medications such as aspirin, angiotensin converting enzyme inhibitors (ACEI), beta-blockers, and statins were found to have a significant increase in survival. Data indicate that the success of compliance to these drugs is low. Discharge prescriptions and content of these prescriptions are considered as the main criteria of success in patients with acute coronary syndrome[1]. A limited number of data indicate that these prescriptions are written appropriately, but in time patients' compliance with these prescriptions is reduced[2-5]. After acute MI (myocardial infarction), 24% of the patients do not take all of their medications during the first week of discharge and 1/3 of them leave at least 1 drug in one month[6-7]. In this study, we compared the patients' discharge medications and the medications used at the end of one year in our clinic and evaluated whether the appropriate drug was prescribed and the patient's compliance.

Material and Methods

Study Population

Patients aged between 18 and 100, who were diagnosed with STEMI and NSTEMI, hospitalized in intensive care unit were included in the study. Patients who were not followed for one

year, those unable to access their records, those who were diagnosed myopericarditis or etc later on, those who were not in the age range of 18-100 and on vitamin K antagonist or new generation oral anticoagulants were excluded. In retrospect, 450 patients were screened from the hospital data system, and data from epicrisis and telephone visits and 413 patients were included in the study. Records of 37 patients could not be reached via registry system or phone visits. Discharge prescriptions and 1 year outpatient control medications were compared. Phone visits were made for ones who did not come to the control visits.

Our study was carried out with the approval of NEU Meram Faculty of Medicine, Non- drug and Non-device Research Ethics Committee dated 18/09/2015 and numbered 2015/322. Informed constants were obtained from all patients.

We have defined the evidence based target doses according to the heart failure guidelines[8].

Statistical Analysis

If the descriptive measures of the variables were categorical, the frequency and percentage ratios were used; If the descriptive measurements of the variables were numerical, mean \pm ss (median, min, max) were used. All discrete and continuous variables were analyzed by Kolmogorov-Smirnov test method.

Since two main groups of patients were identified, Student's



t-test was used for group comparisons where normal distribution was appropriate, and nonparametric Mann-Whitney U test was used for variables not normally distributed. In order to determine the relationship between categorical variables, Monte Carlo corrected chi-square analysis was used. In order to determine whether the change between the categorical variables of repetitive measurements was significant, a cross-table was prepared and the McNemar test statistic was calculated.

To determine the direction and magnitude of the relationship between continuous variables, Pearson Correlation was used,

Spearman's Rho Correlation analyzes were performed for variables that did not meet normal distribution. Type-I error level was taken as 5% and $p < 0.05$ was accepted as statistically significant. All analyzes were performed using SPSS 20.0 package program.

Results

Of the 413 patients included in the study, 25% (n = 101) were female. The diagnoses were NSTEMI with a rate of 38.5% (n = 159) and STEMI with a rate of 61.5% (n = 254). Patients characteristics and drug usage according to MI type were shown in table 1.

Table 1. Patient information, morbidities and one-year follow-up drug use of MI types

		NSTEMI (n=159)	STEMI(n=254)	p
Age	mean±sd	63,98±12,79	62,99±12,29	0,341
Follow-up	mean±sd	12,38±0,99	12,46±1,03	0,447
Gender	Male (%)	107 (%67,3)	205 (%80,7)	0,002*
	Female (%)	52 (%32,7)	49 (%19,3)	
Morbidity	Family History	19 (11,9)	21 (%8,3)	0,219
	Hypertension	94 (%59,1)	105 (%41,3)	<0,001*
	CAD	55 (%34,6)	73 (%28,7)	0,211
	Dislipidemia	48 (%30,2)	76 (%29,9)	0,954
	DM	52 (%32,7)	65 (%25,6)	0,119
	Smoker	47 (%29,6)	72 (%28,5)	0,810
	CRF	15 (%9,4)	31 (%12,2)	0,384
Treatment	Medical	27 (%17)	14 (%5,5)	0,200
	PCI	111 (%69,8)	221 (%87)	
	CABGO	21 (%13,2)	19 (%7,5)	
Drugs Used	ASA (discharge)	157 (%98,7)	254 (%100)	0,074
	Beta bloker (discharge)	147 (%92,5)	243 (%95,7)	0,166
	ACEI/ARB. (discharge)	136 (%85,5)	222 (%87,4)	0,587
	Statin (discharge)	154 (%96,9)	247 (%97,2)	0,819
	Clopidogrel (discharge)	153 (%96,2)	251 (%98,8)	0,079
	Five Drugs (discharge)	118 (%74,2)	207 (%81,5)	0,079
	ASA (end of 1 year)	138 (%86,8)	226 (%89)	0,505
	Statin (end of 1 year)	100 (%63,3)	172 (%67,7)	0,357
	Beta bloker (end of 1 year)	131 (%82,4)	203 (%79,9)	0,535
	ACEI/ARB. (end of 1 year)	116 (%73)	172 (%67,7)	0,260
	Clopidogrel (end of 1 year)	131 (%82,4)	203 (%80,6)	0,643
Five drugs (end of 1 year)	73 (%45,9)	113 (%44,5)	0,777	

The rate of patients who used all five drugs (ASA, beta blocker, ACEI / ARB, statin, clopidogrel) on discharge was 78.7% (n = 325). Rates of those using beta-blocker, ADEI / ARB, statin and Clopidogrel (including those using Ticagrelor and prasugrel) were %94.4 (n = 390) %86.7 (n = 358), %97.8 (n = 401) and %97.8 (n = 404), respectively.

The percentage of those who continued to use ASA after one year dropped to 88.1% (n = 364), the percentage of those who continued to use statin decreased to 66% (n = 273), while the proportion of those who continued to use beta-blockers to 80.9% (n = 334). The percentage of those who continued to

use ACEI / ARB dropped to 69.7% (n = 288). The percentage of those who continued to use clopidogrel decreased significantly (81.3%; n = 336). After one year, the number of patients using five drugs fell to 45% (n = 186).

When the patients were evaluated according to MI types at discharge and one year follow-up; drug use rates decreased in all MI types after one year. There was a significant decrease in the use of all drugs separately and 5 drugs together ($p < 0.01$).

All patients in the STEMI group continued to use ASA. The highest decrease in NSTEMI type patients was seen in the use

of five drugs (40%) and the least decrease was observed in beta blocker use (18%). In the STEMI type, the highest decrease was still in the use of five drugs (34%) and the lowest proportional decrease was in patients using clopidogrel (17%) (Table 1).

In Table 2, the relationship between the drug use and the morbidity of the patients was examined. There was a significant

relationship between the five-drug ratio and CRF and type of treatment when patients were discharged. The rate of CRF was higher in patients who did not use 5 drugs (%30.7) than those discharged with five drugs(%5.8; $p < 0.001$). The ratio of patients who used five drugs (% 83,7) was higher in the PCI group ($p = 0,004$) compared to those treated medically or with CABGO(%14.8 and %17 respectively) ($p=0.004$).

Table 2. The relationship between the drug use and the morbidity of the patients

	Discharged with 5 drugs (413)			5 drugs at the end of 1 year (413)		
	No(%)	Yes(%)	p	No(%)	Yes(%)	p
HT	50 (%56,8)	149 (%45,8)	0,068	101 (%44,5)	98 (%52,7)	0,098
CAD	22 (%25)	106 (%32,6)	0,171	63 (%27,8)	65 (%34,9)	0,116
HL	20 (%22,7)	104 (%32,0)	0,093	51 (%22,5)	73 (%39,2)	<0,001*
DM	27 (%30,7)	90 (%27,7)	0,581	70 (%30,8)	47 (%25,3)	0,212
Family History	5 (%5,7)	35 (%10,8)	0,153	17 (%7,5)	23 (%12,4)	0,096
Smoke	24 (%27,3)	95 (%29,3)	0,707	65 (%28,8)	54 (%29,0)	0,952
CRF	27 (%30,7)	19 (%5,8)	<0,001*	37 (%16,3)	9 (%4,8)	<0,001*
Treatment						
Medical	13 (%14,8)	28 (%8,6)	0,004*	26 (%11,5)	15 (%8,1)	0,010*
PCI	60 (%68,2)	272 (%83,7)		171 (%75,3)	161 (%86,6)	
CABGO	15 (%17,0)	25 (%7,7)		30 (%13,2)	10 (%5,4)	

In the study, it was seen that the target dose of beta-blocker was reached in 68 patients (16.5%) and 74 (17.9%) patients reached to ACEI / ARB target dose. The mean age difference of patients with beta-blocker target dose was statistically significant in NSTEMI ($p = 0.015$). The mean age was 58 years in the target dose group and 65 in the group who could not

reach the target dose. The use of beta-blockers was lower in the elderly.

The rate of patients who had reached ACEI / ARB target dose was significantly higher in patients with HT ($p < 0.001$) (Table 3). Patients with CRF, the rate of those who reached the ACEI / ARB target dose was significantly lower ($p = 0.033$).

Table 3. The relationship between beta blocker and ACEI / ARB target dose rates and morbidity

	Beta-blocker target dose (413)			ACEI/ARB target dose (413)		
	No (%)	Yes (%)	p	No (%)	Yes (%)	p
HT	162 (%47)	37 (%54,4)	0,261	139 (%41)	60 (%81,1)	<0,001*
CAD	106 (%30,7)	22 (%32,4)	0,791	103 (%30,4)	25 (%33,8)	0,567
HL	98 (%28,4)	26 (%38,2)	0,106	99 (%29,2)	25 (%33,8)	0,437
DM	95 (%27,5)	22 (%32,4)	0,421	97 (%28,6)	20 (%27,0)	0,784
Family History	33 (%9,6)	7 (%10,3)	0,853	35 (%10,3)	5 (%6,8)	0,348
Smoker	103 (%29,9)	16 (%23,5)	0,287	104 (%30,8)	15 (%20,3)	0,071
CRF	41 (%11,9)	5 (%7,4)	0,278	43 (%12,7)	3 (%4,1)	0,033*
Treatment						
-Medical	33 (%9,6)	8 (%11,8)	0,238	34 (%10)	7 (%9,5)	0,959
-PCI	282 (%81,7)	50 (%73,5)		272 (%80,2)	60 (%81,1)	
-CABGO	30 (%8,7)	10 (%14,7)		33 (%9,7)	7 (%9,5)	

Discussion

In this study, discharge prescriptions and drugs used at the end of 1 year were compared in 413 patients who were hospitalized with NSTEMI and STEMI diagnoses. Data on continuity of treatment were obtained.

In our study, the rate of ASA, beta blocker, ACEI/ARB, statin and

clopidogrel use was %99.5 %94.4, %86.7, %97.1 and %97.8, respectively. Six-month follow-up of CAD patients admitted to the Internal Medicine and Cardiology Clinic, while ASA was the most used medication, less than a third of patients were found to use beta-blocker, ACEI / ARB and statin, which is according to our patient group, drug compliance was less in this study[9].



Patients who has been prescribed aspirin in a study conducted in the UK on 2153 patients diagnosed with acute MI, the rates were %88 for males, %82 for females and beta blocker prescription was %47 for males and %33 for females and also lower than our study population[10]. In the EUROASPIRE III study, the compliance of discharge prescription with guideline in CAD patients was examined; Turkey and European data were compared. Beta-blockers (82.5% in Europe, 83.1% in Turkey), ACEI / ARB (69.0% in Europe, 73.6% in Turkey) and statin (79.7% in Europe, 82.3% in Turkey) prescribing rates were slightly lower, according to our results[11]. In a university hospital, 84% of patients with acute MI were prescribed beta blockers, %90 of them were prescribed statins, %61 of them were prescribed ACEI / ARB, and %95 of them were prescribed aspirin. These rates were also lower than our study [12]. In one study including acute MI patients, the rates of drug use after 1 year were 72% for beta blockers and 68% for ACEI/ARB. It was lower than our study[13].

In a study conducted in France, drug use rates of acute MI patients after 30 months were found to be %90.5 for beta blockers %85.6 for ACEI/ARB %84.7 for ASA and %95.3 for clopidogrel. The rate of those who used 4 group medication was %71.1[14]. It was higher than our study.

In the patient population, the ACEI / ARB target dose may not be reached, especially in the patient group with CRF, which may be related to the increase in creatine. Optimal treatment in patients undergoing PCI may be due to the fact that patients undergoing CABGO are discharged from the cardiovascular surgery department and followed up for a while in this department and may be subject to different applications. The fact that the target beta-blocker dose in elderly patients could not be reached can be explained by the more symptomatic course of bradycardia episodes of this patient group and the clinician's concern about this

There were various limitations in our study. Although our study is performed in a local area, it may not reflect the use and compliance of the whole society, but it should be kept in mind that where percutaneous and surgical interventions are performed 7/24. The patients whose data were not reached may have continued their follow-up in different centers but the patients whose data were not reached were excluded from the study. With more comprehensive studies, follow-up treatment recipes can be reviewed from the social security institution.

Conclusion

In this study, in our country where access to drugs and health services has become easier due to changes in health policies in recent years; We evaluated the effect of this condition on treatments in patients with ACS (acute coronary syndrome). More effective doses can be achieved with frequent controls for ADEI / ARB use, especially in the CRF group.

According to the data obtained from the study; a decrease was observed in the rates of drug use in ACS patients after one year.

In order to reduce the mortality due to CAD, patients should be treated according to the guidelines at discharge and hospital settings.

Declaration of conflict of interest

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