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Effects of a lifestyle-change program on cardiac risk factors after angioplasty

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ABSTRACT: Aim. The aim of this study was to explore the behavioural and clinical impact of a lifestyle-change intervention for cardiac risk factors in patients after angioplasty.In patients with multivessel coronary artery disease who are undergoing percutaneous coronary intervention coronary angioplasty is the standard method for guiding the placement of the stent.A quasi-experimental design was used.Patients who received percutaneous coronary intervention at a medical centre in Zanjan were sampled by convenience and assigned to two groups. The groups represented alternate times for delivering education. Individuals who received education pre-discharge were compared to individuals who received education post-discharge on the outcomes. Measures of behavioural and clinical outcomes were compared before angioplasty, after and follow-up. Content validity was demonstrated through evaluations made by a panel of experts. The internal consistency reliability coefficient was found to be 0.8 in this study. Descriptive statistics were used to analyze demographic data and repeated measures analysis of covariance was used to determine differences in the outcomes in the groups.The results revealed that the amount of cigarette smoking, blood pressure control, high cholesterol, frequency of physical activity and dietary behaviour were modified in both groups.
Incorporating a lifestyle-change intervention into a postoperative cardiac rehabilitation program effectively modified cardiac risk factors and may improve postangioplasty recovery and prognosis.

Key words: Angioplasty, Cardiac risk factors, Lifestyle-change.

INTRODUCTION

Cardiovascular disease induced by atherosclerosis have increased gradually worldwide with the aging population and changes in lifestyle and diet (Deedwania 2001; Muller-Riemenschneider et al. 2010; Masoumi et al. 2012).In patients with multivessel coronary artery disease who are percutaneous coronary intervention (PCI), coronary angioplasty is the standard method for guiding the placement of the stent. Percutaneous coronary intervention (PCI) could represent the perfect paradigm of medical technology and innovation triumphing over adversity to deliver minimally invasive treatments to patients who previously received surgery or conservative management. In the past 30 years, there have been major improvements in survival from coronary artery disease, in which PCI has played a real role, especially in acute coronary syndrome (ACS). There has been a major reduction in mortality in the general population as a result of improved survival from coronary heart disease (Lenfant 2003; Lauck et al. 2009; Rolley et al. 2009). Recent analyses show a continued reduction in deaths from coronary heart disease, with curative treatment accounting for half of this reduction (Muller-Riemenschneider et al. 2010). Likewise, the continuous national Swedish STEMI (ST elevation myocardial infarction) registry (n=61228) between 1996 and 2007 showed a substantial and sustained reduction in mortality for STEMI, including primary percutaneous coronary intervention (PPCI) (Ford et al. 2007; Jemberg et al. 2011). Coronary artery disease can be treated both medically and surgically, with surgery considered when internal medicine does not effectively improve health. One surgical treatment, percutaneous transluminal coronary angioplasty (PTCA), does not completely stop the progression of atherosclerosis (Calvert et al. 2012). The only way to slow down the disease process and decrease risk factors is by changing lifestyle and appropriate drug therapy (Louck et al. 2009; Hacihasanoglu & Gözum 2011; Gürsoy et al.

2012). Decreasing risk factors for cardiovascular disease is emphasized by both the American Heart Association (American Heart Association 2008) and the European Society of Cardiology (European Society of Cardiology 2008) particularly adjusting and monitoring changeable factors such as smoking, hypercholesteremia, hypertension, diabetes, obesity or overweight and lack of physical activity. Accurate recognition of acute coronary syndrome (ACS) on initial presentation is a key for healthcare providers inside and outside of the hospital setting to the minimization of morbidity and mortality (Gulanick et al. 1998; Patel & Adams 2008; Jemberg et al. 2011; Khosravi et al. 2012).

Therefore, the aim of the present study was to investigate the behavioural and clinical effects of a lifestyle changes program on risk factors of patients who have undergone angioplasty in Zanjan.

METHODS

A quasi-experimental design was used, sequentially, to collect data from patients in the control and experimental groups. For both groups, data were collected three times: one to two days before discharge, one week after hospital discharge and follow-up within 3 weeks post-discharge. Inclusion criteria: 1- Underwent angioplasty surgery for the first time, with no additional surgical interventions. 2- Literate in Persian. 3- Oriented to time, place, and person. 4- Have access to a working phone both in the hospital and at home. Subjects were assessed for cardiac risk factors as well as baseline demographic and clinical characteristics. Data on these variables were collected using an instrument with two parts: a risk factor tracking form and a patient information form. The instrument's content was reviewed and its content validity index was determinated by experts. Items were rated on a five-point Likert Scale. Symptoms were assessed using the Symptom Inventory which is a 18-item self-report checklist of symptoms specific to angioplasty recovery such as tiredness, trouble sleeping, trouble breathing or shortness of breath, chest pain, leg incision pain or discomfort, shoulder back, neck, or abdominal pain/discomfort, incision redness, increased tenderness at incision site, constipation, edema or swelling in arms and legs, nausea, anxiety, emotionally drained, vomiting, dizziness, and irregular heart beat. Participants were asked to describe the frequency with which a given symptom occurred during the previous week (frequency ranged from 1=not at all to 5=always). A total score was calculated by summing the item scores. Scores ranged from 20 to 100, with higher numbers indicting a higher frequency of symptom experience in the past couple of days. The scale items were internally consistent (cronbach's alpha=0.92) in this study. Descriptive statistics (i.e. measures 0f central tendency and dispersion) were used to characterize the sample in terms of demographic and illness-related characteristic, as well as to describe the outcomes measured at each point in time. Repeated measures analysis of covariance (RM-AOVA) was used to determine differences in the outcomes in the groups if participants who received education pre-discharge and post-discharge.

RESULTS

A total of 100 patients who met the eligibility criteria were approached upon admission to the cardiovascular surgical unit, to participate in the study. Of the 100 patients who provided written consent, 50 participants were randomly assigned to either the pre- or post-discharge groups. On average, the subjects were predominantly male(61%), married(98%) and about 63 years old. The most frequently reported co-morbid conditions were: high blood pressure (52%), high cholesterol (40%) and diabetes (38%) and predisposing factors were: Smoking (39%), uric acid (9%0) and obesity (33%)(Table 1). Evaluation of subjects' smoking behaviour by repeated measures ANOVA indicated that number of cigarettes smoked per day varied with time after hospital discharge (F=158/12, P=0.001). Smoking behaviour decreased significantly more in the experimental group than the control group (Independent t= 2.05, P=0.05). Comparison of cholesterol and triglyceride levels within and between groups indicated (1) cholesterol decreased significantly within both groups from pre-discharge to 3 weeks after hospital discharge (P=0.001), but this change was not significantly different between groups and (2) triglycerides decreased significantly within the experimental group from pre-discharge to post-discharge groups. Analysis of systolic blood pressure (SBP) by repeated measures ANOVA showed a positive relationship with time (F=25.58, P=0.001), after controlling for diabetes history. Evaluation of between-group differences in SBP by independent t-tests at three times revealed that SBP at 3 weeks after discharge was significantly lower in the post-discharge group than in the pre-discharge group (t=4.85, P=0.001). Assessment of diastolic blood pressure (DBP) by repeated-measures ANOVA indicated no relationship with time in either the pre-discharge or post-discharge group.

Fasting blood glucose levels before angioplasty were shown by independent t-test to be significantly higher in the post-discharge group than in the pre-discharge group (t=2.25, p=-0.001). Blood glucose levels

decreased in both groups from pre-angioplasty to 3 weeks after discharge. This decrease was significant only for the post-discharge group (t=0.45, P=0.01).

Table 1 . Demographic data for pre- and post-discharge and total groups.

Variable	pre-discharge group(n=50)	post-discharge group (n=50)	total group (N=100)
Age[mean(SD)]	64 (12)	61 (12)	63 (12)
Gender (%)			
Male	33 (66)	28 (56)	61 (61)
Female	16 (34)	22 (44)	39 (39)
Marital status [exact number (%)]			
Married	49 (98)	49 (98)	98 (98)
Non-married	1 (2)	1 (2)	2 (2)
Highest level of education received [exact number (%)]			
Less than high school	41 (82)	42 (84)	83 (83)
High school	8 (16)	8 (16)	16 (16)
BS/BA	1 (2)	0 (0)	1 (1)
Co-morbid conditions [exact number (%)]			
High blood pressure	29 (58)	23 (46)	52 (52)
High cholesterol	20 (40)	20 (40)	40(40)
Diabetes	17 (34)	21 (42)	38 (38)
Arthritis	2 (4)	2 (4)	4 (4)
Predisposing factors [exact number (%)]			
Smoking	24 (48)	15 (30)	39 (39)
Obesity	14 (28)	19 (38)	33 (33)
OCP	3 (6)	2 (4)	5 (5)
Personality type A	1 (2)	4 (8)	5 (5)
Uric acid	4 (8)	5 (10)	9 (9)
Positive family history	1 (2)	1 (2)	2 (2)
Ovariectomy premenopausal	1 (2)	2 (4)	3 (3)

Table2. Group Statistics

	group	N	Mean	Std. Deviation	Std. Error Mean
Checklist	postdischarge	50	12.40	15.039	2.127
	predischarge	50	17.70	13.222	1.870
Checklist	postdischarge	50	43.08	8.898	1.258
	predischarge	50	38.14	16.043	2.269

Table 3. Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
checklist	.176	.676	-1.872	98	.064	-5.300	2.832
checklist	26.176	.000	1.904	98	.060	4.940	2.594

DISCUSSION

The study results showed that our lifestyle-change program, in combination with routine post angioplasty rehabilitation, significantly improved smoking behaviour, dietary behaviour, triglyceride levels and blood glucose for patients who had undergone angioplasty. Bp and physical activity significantly improved for the discharge group in the 3 weeks after discharge. Before angioplasty, 47-54% of patients in both groups were smokers. After angioplasty, smoking by patients in both groups dropped dramatically. These smoking cessation rates are much lower than previously reported the smoking behaviours of the pre-discharge group in our study differed from those in a previous study conducted in Tawan (Charlson et al. 2008; Hwang et al. 2009). In that study, control group patients strongly felt that their life was threatened in the first month after hospital discharge and 10% stopped

smoking. Early studies by Charlson et al. demonstrated that a program of intensive multifactor risk reduction reduced luminal narrowing in coronary arteries of men and women with coronary disease (Charlson et al. 2008).

In the terms of cholesterol levels, both groups achieved slight decreases that fell within the acceptable range in the first week after hospital discharge. In the terms of triglycerids, the change from pre angioplasty to the first week after hospital discharge was very large in post-discharge group, significantly better than that in the pre-discharge group. This improvement in the post-discharge group might be due to their better dietary control, which has a greater influence on triglycerids (Sadeghzadeh & Moshtagh Eshgh 2011).

Pre angioplasty SBP of both groups reached levels for preliminary and first-stage hypertension. At the first and third weeks after hospital discharge, the post discharge group had less variance in SBP than the pre discharge group. The better SBP of the post discharge group could be explained by their better control of a high-chloride diet. These results are consistent with previous reports that BP can be effectively decreased by diet, e.g. a low-chloride diet (Sai et al. 1995; Piepoli et al. 2010). Treatment with antihypertensive drugs was not significantly different between groups, excluding drug treatment as a reason for the difference in SBP.

Pre angioplasty fasting blood glucose was high in both groups, which could have been due to either pre angioplasty disease or hospitalization stress. Change in blood glucose from pre angioplasty to the first week after hospital discharge was significantly better in the post discharge group than in the pre discharge group and could be related to a better control of diet and exercise. Indeed, strengthening physical activity and dietary control have been shown to improve blood glucose levels (Mann et al. 2006; Lin et al. 2008; Fredericks 2009; Hacihasanoglu & Gözum 2011). The changes in blood glucose were significant for both groups, which is consistent with the results of previous studies. Previous researchers reported a significant decrease in blood glucose levels for both experimental and control groups after the intervention, compared to a significant decrease in BP and cholesterol levels for the experimental group only and specially for women (Ham & Kim 2010; Farag et al. 2010; Gürsoy et al. 2012).

CONCLUSIONS

When lifestyle changing health education was added to routine post-angioplasty rehabilitation, patients who had angioplasty, improved significantly more from pre angioplasty to the first week after discharge than the pre discharge group in terms of smoking rate, change in triglyceride levels and fasting blood glucose. Furthermore, the post discharge group improved significantly more than the pre discharge group at the third week after discharge in terms of Bp, physical activity. In terms of diet, the post discharge group significantly improved over the pre discharge group in the first week after hospital discharge and such difference persisted till the third week after discharge.

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Conflict of interest

There is no Conflict of interest to declare.

Author Contributions

Study Design: VS; data collection and analysis: VS, IGH; SSRK & JN; and manuscript preparation: VS.

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