EFFECT OF INTERVENTION ON THE CONTROL OF RISK FACTORS IN CORONARY ARTERY DISEASE PATIENTS

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ABSTRACT

***Objective**: To assess the effect of optimal medical therapy on the control of risk factors in coronary artery disease (CAD) patients with or with-out intervention.*

***Methodology:** It was a cross sectional comparative study carried out at Lady Reading Hospital, Peshawar January to December 2010. Subjects were divided into two groups based on percutaneous coronary intervention and optimal medical therapy. Study variables were smoking, physical activity, dyslipidemia, diabetes, hypertension and obesity. Informed written consent was taken from all the study participants. Data was recorded on a preformed Questionnaire and analyzed with SPSS version 16. P-value of 0.05 was taken as significant.*

***Results:** A total of 315 patients were studied. Baseline characteristic were similar between groups. Smoking was decreased significantly in(PCI group) as compared to (OMT group) (p=0.027). Physical activity goal ⩾ 150 min/ week were achieved more in (PCI group) compared to (OMT group)(p=0.019). Goals set for Serum cholesterol, HbA1c%, serum LDL, Systolic blood pressure and Diastolic blood pressure have significantly achieved in (PCI group) as compared to (OMT group) with p- valves of (0.018,0.027,0.023,0.033 and 0.017) respectively. While goals set for Triglycerides, serum HDL and BMI have no significant difference between the two groups with p-valves of (0.223, 0.089 and 0.164 respectively).*

***Conclusion:** Patients who underwent intervention and remained on optimal medical therapy were more adherent to regular exercise and good compliance which lead to better risk factors control for coronary artery disease as compared to patients who remained on optimal medical therapy alone.*

***Key Words**: Coronary Artery Disease (CAD), Optimal medical therapy, Risk factors, Intervention.*

This article may be cited as: Rauf MA, Aman W, Shah ST, Khan N, Khan SB, Khan I, et al. Effect of Intervention on the Control of Risk Factors in Coronary Artery Disease Patients. J Postgrad Med Inst 2012; 26(3): 253-60.

INTRODUCTION

There are marked variations in the epidemic of CAD among regions of the world, nations, and even between regions within a country[1].According to the Global Burden of Disease Study[2], the developing countries contributed 3.5 million of the total number of 6.2 million deaths from CAD in 1990. The projections estimate that these countries will account for 7.8 million of the 11.1 million deaths due to CAD in 2020. According to global and regional projections of mortality and burden of disease,CAD will remain the leading cause of death for the next 20 years[3].

During the past 30 years, the use of percutaneous coronary intervention (PCI) has become common in the initial management strategy for patients with stable coronary artery disease in North America, even though treatment guidelines advocate an initial approach with intensive medical therapy, a reduction of risk factors, and lifestyle intervention (known as optimal medical therapy)[4,5].

PCI reduces the incidence of death and myocardial infarction in patients who present with

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Date Received: August 8, 2011
Date Revised: April 28, 2012
Date Accepted: May 7, 2012

acute coronary syndromes[6-11], but similar benefit has not been shown in patients with stable coronary artery disease[12-16]. To treat chronic angina effectively, we must practice aggressive evidence-based, globally-centered cardiovascular medicine focused on multilevel risk reduction. The conservative use of PCIs to treat CAD is an important part of our treatment armamentarium. However, we must educate our patients so that they fully understand how effective positive lifestyle changes and strict medication compliance are to their cardiac profile.

The wise and seasoned cardiovascular physician takes an individual approach to each patient with CAD and combines both invasive and noninvasive treatment plans to effectively reduce symptoms, morbidity, and overall cardiovascular mortality. Evidence-based treatment of chronic stable angina has shown that aggressive control of blood pressure and appropriate control of LDL-C levels are of paramount importance. Additionally, guided exercise programs and assessment for underlying depression cannot be overlooked. A patient-centered approach to care should be the focus for each patient with the diagnosis of coronary artery disease[17].

There are three strategies for patients with coronary artery disease (CAD); medical therapy, coronary artery bypass graft (CABG), and percutaneous coronary intervention (PCI). With the development of drug-eluting stents, PCI is now widely used as the first line treatment around the world. The advantage of CABG over PCI, however, remains in patients with left main coronary artery disease, three-vessel disease, and diffuse CAD. PCI and CABG do not exist in isolation because relieving the symptoms of angina is not the goal of treatment of CAD. But still there are patients which have coronary artery disease but not intervened. It is due to many causes like minimal CAD, un affordability, patients own will etc.

Percutaneous coronary interventions (PCI) combined with Optimal Medical Therapy (OMT) was no more effective than OMT alone in preventing heart attacks and other cardiac events among patients with coronary artery disease. It has been conventional wisdom internationally that PCI used together with OMT is superior to using OMT alone, however The Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) trial had proved otherwise[18].

Optimal medical therapy is of intense need in both condition either intervened or not. Secondary prevention with vigorous modification of risk factors should be initiated and maintained. The aim of our study was to asses the effect of optimal medical therapy on the control of risk factors in coronary artery disease (cad) patients with or with-out intervention.

METHODOLOGY

This was a cross-sectional comparative study conducted at cardiology unit of tertiary care hospital in Peshawar Khyber Pukhtunkhwa a major city of Pakistan. Study was conducted from January 2010 to December 2010. This unit consists of 60 regular beds, well equipped cardiac care unit; highly organized cardiac catheterization lab with recent 6 cardiac catheterization machines and laboratory for all relevant investigation is available. This unit provides proper counseling regarding life style modification such as diet, exercise and smoking cessation not only to patients but also to their family members to emphasize secondary as well as on primary prevention of CAD. Our unit also offers a cardiac checkup package, which includes complete history taking, physical examination with basic laboratory investigations and relevant management to outpatients as well as emergency patients. All the information's regarding patients are recorded in our unit computer data base record.

In this study all adults (>24 years) presenting to our unit with positive previous history of CAD, who were on treatment for six or more than six months and having at least two or more follow up visits were included. Study subjects were divided in to two groups based on the fact that either they had under gone intervention (PCI or CABG) and on optimal medical treatment, for convenience we called it PCI group or without intervention and only on optimal medical therapy (OMT) we called it OMT group. In PCI group we included all those patients who underwent primary or secondary PCI or CABG irrespective of the number of arteries while in OMT group all those who did not undergo intervention due to any reason like lack of money, lack of opportunity, patients desire of not being intervene or no need for intervention were included.

Written informed consent was obtained from all the subjects prior to interview. Clinical data were obtained from the medical record of the subject and laboratory data from investigation conducted at hospital laboratory during study. HbA1c % was performed in only those patients who were diabetic. Physical activity goal was set as $\geqslant$ 150 min/ week brisk walking. Smoking cessation means complete cessation. All the subjects were interviewed at out-patient department (OPD). The study had the approval of the Ethical Committee of the institution. All these details were recorded on preformed questionnaire.

Data were entered and analyzed in the Statistical Package of Social Sciences (SPSS) program version 16. Data were expressed as numbers and percents, mean ± SD. Chi square tests were used to compare categorical variables while student t-test was used for continuous variable. P-value of <0.05 was taken as statistically significant.

RESULTS

A total of 400 patients were included in the study divided equally in both groups. Patients finally studied were 315, rest either lost to follow up or did not fulfill the criteria. Baseline characteristic were similar between groups (Table 2). Smoking was decreased significantly in (PCI group) as compared to (OMT group) (p=0.027).

Table 1: Risk Factors Goals Set for Our Study

Risk Factor	Goal
Smoking	Cessation
Total cholesterol	<150 mg/dl
LDL cholesterol	<70mg/dl
HDL cholesterol	>40mg/dl
Triglyceride	<100mg/dl
Diabetes	HbA1c < 7.0 %
Blood pressure	<130/80mm Hg
Body weight by BMI	<24.9kg/m^2
Physical activity	>150 mins /week

Table 2: Base line Characteristics

Characteristics	PCI group (n=157)	OMT group (n=158)	P-valve
Sex*			
Male Female	111 (71) 46(29)	111(70) 47(30)	0.95
Risk factors			
Diabetes	51(32.5)	51(32.5)	0.94
Hypertension	91(58)	93(59)	0.80
Smoking	43(27)	44(28)	0.81
Family history	21(13%)	20(12.5)	0.95
History of MI			
STEMI	50 (32%)	52(33%)	0.79
NSTEMI	98 (62%)	97(61%)	0.94
Physical			
Weight (BMI)	27.57±3.29	27.17±3.3	0.284
Systolic BP (mmHg)	140.38±18.63	142.06±22.53	0.473
Diastolic BP (mmHg)	87.17±7.62	88.29±8.55	0.219
Laboratory values			
Serum cholesterol (mg/dl)	173.78 ± 43.84	171.48 ± 38.39	0.622
Serum LDL (mg/dl)	83.56 ± 28.53	84.20 ± 25.3	0.833
Serum HDL (mg/dl)	29.43 ± 9.76	28.56 ± 10.96	0.494
Serum TGs (mg/dl)	288.43± 109.69	267.08 ± 91.92	0.320
HbA1c%(Diabetics)	8.10± 2.19	8.18±1.64	0.827

*Variables were compared with the chi-square, n (%). PCI= percutaneous intervention; OMT= optimal medical therapy

Table 3: Risk Factors Outcomes in both groups

Risk factors	PCI group(n=157)	OMT group(n=158)	P-value
Physical			
Weight (BMI)	26.39±2.95	26.45±3.23	0.873
Systolic BP (mmHg)	131.97±17.26	136.58±20.15	0.03
Diastolic BP (mmHg)	82.48±7.93	85.63±10.44	0.003
Laboratory values			
Serum cholesterol (mg/dl)	153.78 ± 41.63	159.45 ± 36.59	0.031
Serum LDL (mg/dl)	72.56 ± 25.81	78.20 ± 23.42	0.023
Serum HDL (mg/dl)	35.73 ± 8.71	33.56 ± 9.43	0.638
Serum TGs (mg/dl)	248.70± 88.11	243.04 ± 76.34	0.543
HbA1c%	7.30± 1.48	7.97±1.47	0.014

Table 4: Risk Factors goals achieved in both groups

	PCI group(n=157)	OMT group(n=158)	P-value
Smoking (n=43)	26 (60.5%)	13(29.5%)	0.027
Total cholesterol	101(64.3%)	81(51.3%)	0.023
LDL cholesterol	96(61.1%)	75(47.5%)	0.018
HDL cholesterol	77(50.3%)	62(36.7%)	0.089
Triglyceride	39(28.8%)	30(19.0%)	0.223
HbA1c% (n=51)	26(51%)	13(25.5%)	0.027
SBP<130mmHg	112(71.3%)	94(59.5%)	0.033
DBP<80mmHg	98(62.4%)	77(51.3%)	0.017
Body weight by BMI	48(30.6%)	37(23.5%)	0.164
Physical activity	66(42%)	46(29.1%)	0.019

Physical activity goal ⩾ 150 min/ week were achieved more in (PCI group) compared to (OMT group) (p=0.019). Goals set for Serum cholesterol, HbA1c%, serum LDL, Systolic blood pressure and Diastolic blood pressure have significantly achieved in (PCI group) as compared to (OMT group) with p- values of (0.018,0.027,0.023,0.033 and 0.017) respectively. While goals set for Triglycerides, serum HDL and BMI have no significant difference between the two groups with p-valves of (0.223, 0.089 and 0.164 respectively). (Table 3).

DISCUSSION

Numerous large randomized clinical trials have demonstrated the efficacy of secondary prevention of coronary artery disease (CAD). Effective lifestyle interventions include smoking cessation[19], dietary intervention[20, 21], andexercise[22, 23]. Studies of control of blood pressure[24], low-density lipoprotein (LDL) cholesterol[25], and—less consistently - blood glucose[26] serve as the basis for current secondary prevention guidelines.The largest reductions in coronary deaths came from the use of secondary prevention medications after an acute myocardial infarction (MI) or after revascularization. Although PCI can reduce the incidence of angina and improve quality of life in patients with stable coronary disease, it has not been shown to reduce death and MI in chronic stable patients as it has in patients with an ACS. A reduction in death and recurrent cardiovascular events can be achieved, however, with optimization of medical therapy that focuses on aggressive coronary heart disease (CHD) risk factor reduction. Previous randomized trials that compared percutaneous

coronary intervention (PCI) with medical therapy in patients with stable CAD failed to apply medical therapy that was multifaceted, aggressive, and provided equally to both treatment arms[27].

We studied control of risk factors in patients with CAD in two groups' i.e PCI group and OMT group. It was found that there was no statistically significant difference between the two groups regarding different risk factors control.

Cigarette smoking is probably the most important of the identified modifiable cardiovascular risk factors. The incidence of CAD is two to four times higher in smokers than it is in nonsmokers[28].

In ours study the target of smoking cessation achieved in both groups, was less as compared to Teoet al[29] despite of proper counseling of patients as well as family members. Further more there was no significant difference between the two groups, similar to Teoet al[29]. If a clinician does not aggressively address smoking cessation in every patient who smokes, then the clinician is not practicing appropriate cardiovascular disease prevention.

The medical approach to patients with CAD should always include aggressive lipid management.It is apparent that in both primary and secondary prevention lipid trials achievement of a lower LDL-C level equates to reduce cardiovascular event rates. On the basis of evidence-based data, patients with established CAD benefit from reduction of their LDL-C levels to less than 70 mg/dl. It is unclear whether the statins dose or the resultant LDL-C level produces the best risk reduction.[30]We observed less number of patients who achieved target total cholesterol, LDL and triglycerides. There was no significant difference between the two treatment groups. Maron et al[31] and EUROASPIRE III trial reported higher number of patients achieving target goals for total cholesterol and LDL-C, 54% and 70%, respectively. The reason of our less goal achievement might be attributable to several factors, like lack of education and short duration of study for evaluating risk factors as compared to previous studies.

Diabetes mellitus (DM) is a major risk factor for cardiovascular disease (CVD), including coronary artery disease (CAD), stroke and peripheral arterial disease. As compared with individuals without DM, CVD is 2–4 times more common in people with diabetes and is associated with a higher mortality[32]. Glycemic control is best assessed by measuring hemoglobin A1c (HbA1c), which gives an indication of the blood glucose levels during the previous 2–3 months. The normal range of HbA1c is between 4% and 6%. The American Diabetes Association (ADA) suggests a HbA1c of <7% as the standard goal for good glycemic control.[33] This goal of good glycemic control was not achieved in both treatment groups in our study, which is in accordance with Boden et al[18].

Hypertension is a common, well-established, major cardiovascular risk factor. Clinical trials in patients with CAD have shown that blood pressure higher than 140/90 mm hg is associated with a 20% to 60% increased risk of death, myocardial infarction, and stroke[34,35]. clinical wisdom suggests and published literature confirms that aggressive control of blood pressure is an important goal in CAD patients. In 2007, the American heart association updated their blood pressure goals for CAD patients to lower than 130/80 mm Hg.[36]Teoet al[29] reported the same target blood pressure achievement in both treatment groups which was also observed in our study. On the other hand, Maronet al[31] quoted more achievement of target blood pressure. The probable reason might be that Maronet al[31] baseline blood pressure was well controlled as compared to our patients.

Exercise should be encouraged in patients with CAD once all testing (both invasive and noninvasive) has been completed and a solid medical regimen has been established. In a recent review of interventions incorporating exercise as part of a cardiac rehabilitationprogramme, Jolliffeet al.[37] observed a reduction in total mortality. Exercise-only interventions resulted in a 27% reduction in total mortality and 31% reduction in cardiac mortality while comprehensive rehabilitation reduced mortality to a lesser extent (26%).The physical activity recommendation for CAD patients is 30-45 minutes/day, moderate intensity 5 times/week. In our study we found that physical activity goal was achieved slightly more in PCI group as compared to OMT group with no statistical significance. This is in agreement with COURAGE trial.

Weight reduction is an important tool to reduce cardiovascular morbidities and mortality. The goal to achieve desired weight body mass index is < 25 kg/m^2. We found same result in both treatment groups as in Maronet al[31] and Teo et al[29].

PCI has achieved a substantial improvement in quality of life for patients with chronic angina. Reduction in cardiac events, however, is best achieved by aggressive optimization of known cardiovascular risk factors. Our study demonstrated that intervention confers clear benefit with optimal medical therapy as compared to optimal medical therapy alone in

control of risk factors of coronary artery disease. Future studies will help to clarify the optimal treatment targets and help guide the use of combination therapies.

Our study had some limitations. It was short duration follow up study that's why we had not included death, myocardial infarction and stent stenosis etc as end points.

CONCLUSION

Patients who underwent intervention and remained on optimal medical therapy were more adherent to regular exercise and good compliance which lead to better risk factors control for coronary artery disease as compared to patients who remained on optimal medical therapy alone.

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CONTRIBUTORS

MAR conceived the idea and planned the study. WA, STS, NK, SBK, IK, NM & MH did the data collection and analyzed the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.