



**ORIGINAL ARTICLE**

**Effect of Comprehensive Lifestyle Modification and Meditation on Coronary Atherosclerosis and Its Risk Factors**

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[Received on: 2 October 2019; Accepted on: 1 December 2019; Published on: 1 January 2020]

**Abstract**

**Background:** Comprehensive lifestyle modification has an effect on coronary atherosclerosis. **Objective:** This study was performed to determine the effect of comprehensive lifestyle modification and meditation on coronary atherosclerosis. **Methodology:** This cohort study was done by Quantum Foundation, Dhaka, Bangladesh during the period of January 2010 to December 2014. Patients who had attended the 2-days long orientation program on comprehensive lifestyle modification, meditation and overview of coronary artery disease were included in the study. Participants who had attended  $\geq 10$  monthly and  $\leq 2$  monthly follow up & counseling session were defined as compliant and noncompliant group respectively. Patients were follow up for angiogram. **Results:** A total number of 32 patients were divided into compliant and noncompliant groups. Patient in the compliant group used to take heart healthy diet in 100.0% cases and avoided heart-unhealthy diet in 100.0% cases as well. Patients in the compliant group were also adherent to daily practice of meditation in 100.0% of cases and it was only 26.7% in case of non-compliant ( $P < 0.001$ ). From baseline and repeat angiogram Gensini scoring was done to determine the regression of coronary blockage. Regression of coronary blockage was observed in 61.5% cases of compliant group and 10.5% in non-compliant group ( $P < 0.001$ ). **Conclusion:** Comprehensive lifestyle modification and meditation can regress coronary atherosclerosis. [*Journal of Current and Advance Medical Research, January 2020;7(1):24-29*]

**Keywords:** Coronary atherosclerosis; lifestyle modification; meditation

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**Cite this article as:** Hossain MA, Moniruzzaman, Yesmin S, Choudhury AM, Islam MK, Mahmuda A, Salam MA, Choudhury SR. Effect of Comprehensive Lifestyle Modification and Meditation on Coronary Atherosclerosis and Its Risk Factors. J Curr Adv Med Res 2020;7(1):24-29

**Funding:** This research did not receive any grant from any funding agency in the public, commercial or not-for-profit sector.

**Conflict of Interest:** The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

**Contributions to authors:** Drafting the article: Hossain MA; Conception & design: Hossain MA, Moniruzzaman, Yesmin S; Acquisition of data: Mahmuda A, Islam MK; Final Approval of completed article: Choudhury AM, Salam MA & Choudhury SR

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## Introduction

Coronary artery disease (CAD) is a major cause of premature mortality and morbidity in both developed and developing countries<sup>1-3</sup>. World health organization (WHO) has also identified CVD as the leading cause of death globally. It is an important medical and public health issue throughout the world. Approximately 80% of the CVD burden arises from low and middle income countries and continuous efforts are needed to prevent CVD in both developed and developing countries<sup>4</sup>. Bangladesh has been experiencing epidemiological transition from communicable disease to non-communicable disease<sup>5</sup>. A study from rural Bangladesh demonstrated a dramatic increase in CVD from 1986 to 2006. The age-standardized CVD mortality rates increased by 30-fold from 16 deaths per 100,000 to 483 deaths per 100,000 among males and 47-fold (from 7 deaths per 100,000 to 330 deaths per 100,000) in females<sup>6</sup>. Moreover, coronary heart disease puts a heavy burden both financially and in terms of quality of life. Cost to treat heart disease in USA<sup>7</sup> will triple by 2030. In Bangladesh treatment cost is also very high and low and medium income group patients cannot afford the expenditure. Therefore it is important to implement effective strategy to prevent heart disease and stroke. Ornish et al<sup>8</sup> has revolutionized the treatment strategy of coronary artery disease. Ornish et al<sup>8</sup> reported that comprehensive lifestyle changes might be able to bring about regression of atherosclerotic lesions, without use of lipid-lowering drugs proved by coronary angiography after only 1 year. AHA has adopted this approach to improving cardiovascular health, focusing on healthy diet, regular exercise, abstaining from smoking and maintaining normal body weight<sup>9</sup>. In this study we applied a combination of low fatty diet, walking, meditation and quantum exercise which is simplified yoga to reduce progression of coronary atherosclerosis. Gupta et al conducted a study on regression of coronary atherosclerosis through healthy lifestyle<sup>10</sup>. Three major components of their program were stress management through Raj yoga meditation, low fat high fibre vegetarian diet and moderate aerobic exercise. After two years they found improvement of coronary stenosis in a dose depended manner.

CAD is now widely recognized as a lifestyle disease, so its management should be lifestyle modification<sup>11</sup>. In regarding lifestyle changes Quantum Foundation is conducting a course on meditation which is very effective in changing attitude and lifestyle. Many persons have overcome

their chronic physical illness including coronary heart disease. In the light of this experience Quantum Heart Club is conducting a program on prevention and reversal of coronary heart disease. If one can modify one's lifestyle and practice regular meditation he can prevent and cure atherosclerosis. But no study has been conducted before this in our country. Our aim is to determine the effect of comprehensive lifestyle modification and meditation on coronary atherosclerosis and its risk factors. This present was undertaken to determine the effect of comprehensive lifestyle modification and meditation on coronary atherosclerosis and its risk factors.

## Methodology

The retrospective cohort study was performed by Quantum Foundation, Banasree, Rampura, Dhaka, Bangladesh in collaboration with National Heart Foundation, Dhaka, Bangladesh during the period of 2010 to 2014. Patients who had attended the 2-days long orientation program conducted by Quantum Heart Club were included in the study. Patients with stable coronary artery disease who attended an orientation program on "Coronary Heart Disease Prevention and Reversal" conducted by Quantum Heart Club, ETT positive cases, patients with symptoms of coronary artery disease, patients with coronary stenosis documented by angiogram done within one year were included in this study. Unstable angina or acute coronary syndrome, unwilling to undergo intensive lifestyle changes or Unwilling to undergo follow-up coronary angiogram were excluded from this study. Stable CAD patient attended a 2 days orientation program on 'Coronary Heart Disease Prevention & Reversal' by Quantum Heart Club since May 2010 to February 2014. In this program patients were informed about causes, risk factors, pathophysiology and different treatment options of coronary artery disease in easy language. Then they were informed about lifestyle modification and its effect on coronary artery disease. They were also taught quantum exercise which is simplified yoga and quantum meditation and encouraged to do meditation and exercise along with dietary modification. They were also asked to take part in weekly counseling session and monthly check up program conducted by the counselor doctors of Quantum Foundation. They had to adhere to this program for a period of minimum one year. Baseline data were recorded in a data collection sheet including detailed history, risk factors, physical examination and investigations. After a period of minimum one year follow-up patients were divided into two groups according to the

adherence to the meditation and lifestyle related program. Based on the follow-up data patients were divided into a compliant group (those who are adherent to the advice) and non-compliant group (those who are non-adherent to the advice). From the participants patients agreed to take part in the study and fulfilled inclusion criteria. Participants who have attended  $\geq 10$  monthly follow up & counseling session are defined as compliant group. Those who have attended  $\leq 2$  monthly follow up & counseling session are defined as noncompliant group. Patients in both group were identified based on the follow-up data. All patients were invited to go through a repeat angiogram at National Heart Foundation Hospital & Research Institute (NHFH&RI). Before doing follow up angiogram 5 participants from compliant group and 8 patients from noncompliant group refused to do repeat angiogram and were excluded from the study. Patients undergone follow up angiogram. Both previous angiogram and the repeat angiogram were assessed by a team of cardiologist and severity of the CAD were quantified according to eye ball estimation as per NHFH&RI cath lab protocol and Gensini scoring was done to determine the regression of coronary blockage. Cardiologists were blinded about the intervention group of the patients. All relevant investigations included in angiogram packages (CBC, fasting blood glucose, HbA<sub>1c</sub>, total cholesterol and 2-D echocardiograms) were also done. Data collection tool was a semi-structured questionnaire containing structured question according to the objective and variable of the study. Baseline data were recorded in a data collection sheet including detailed history, risk factors, physical examination and investigations. After a period of minimum one year re-angiogram and relevant investigations were done and recorded. Baseline parameters were compared with the follow-up parameters. All collected data were checked and verified for its completeness, correctness and internal consistency to exclude missing or inconsistency data. After checking and re-checking data cleaning, sorting and data analysis were done by SPSS version 17.0.

## Results

A total number of 32 patients were divided into two groups as compliant and noncompliant who completed the study. Patients' baseline characteristics were similar in both the groups. Mean age was  $49.38 \pm 9.64$  and  $52.26 \pm 7.02$  years in compliant and non-compliant group respectively (Table 1).

**Table 1: Distribution of Age by Groups (Year)**

Age Group	Groups		P value*
	Compliant	Non-Compliant	
Mean $\pm$ SD	49.4 $\pm$ 9.64	52.3 $\pm$ 7.02	0.336
Range	32-65	35-63	

\*t test was done the measure the level of significance

There was also no statistically significant difference in body weight and BMI in both the group (Table 2).

**Table 2: Quantitative Variables by Groups**

Baseline Parameters	Groups		P value
	Compliant	Non-Compliant	
Height	165.9 $\pm$ 4.91	165.1 $\pm$ 6.67	0.721
Weight	68.8 $\pm$ 7.42	66.8 $\pm$ 10.46	0.572
BMI	25.0 $\pm$ 2.48	24.40 $\pm$ 2.60	0.526
Pulse(beats/min)	72.9 $\pm$ 9.26	74.63 $\pm$ 7.21	0.562
SBP1(mmHg)	126.9 $\pm$ 11.82	126.1 $\pm$ 17.84	0.879
DBP1(mmHg)	82.69 $\pm$ 8.81	82.1 $\pm$ 6.31	0.827
SBP2(mmHg)	126.9 $\pm$ 11.82	125.8 $\pm$ 17.82	0.842
DBP2(mmHg)	82.7 $\pm$ 8.81	82.1 $\pm$ 6.31	0.827

\*t test was done the measure the level of significance.

Dietary habit of the compliant group and non-compliant group was also more or less similar at the beginning of the study. No patients in the present study was used to take physical exercise or brisk daily walking before entering the study (Table 3).

**Table 3: Patients by Heart Unhealthy Diet Groups**

Baseline Dietary Intake Status	Groups		P value
	Compliant	Non-Compliant	
<b>Heart-Unhealthy diet Intake Category</b>			
No intake	0(0.0%)	1(5.3%)	0.576
Less intake	8(61.5%)	13(68.4%)	
Moderate intake	5(38.5%)	5(26.3%)	
<b>Heart-Healthy Diet Intake Category</b>			
Moderate intake	10(76.9%)	10(52.6%)	0.26
Les Less intake	3(23.1%)	9(47.4%)	

\*Chi square test was done the measure the level of significance; \*\*Fisher's Exact test was done the measure the level of significance; Figure within parentheses indicates in percentage.

In the compliant group 15.4% patients were smoker and 30.8% cases were ex-smoker and in the non-compliance group 15.8% patients were smoker and 52.6% cases were ex-smoker ( $p < 0.554$ ). There was

no statistically significant in both the group regarding use of smokeless tobacco (Table 4).

Serum lipid profile level were more or less similar in both the group and no statistically significant difference was observed. Total cholesterol was found in  $160.05 \pm 58.67$  mg/dl and  $171.47 \pm 49.53$  mg/dl in compliant and non-compliant respectively. HDL was  $33.05 \pm 9.55$  mg/dl and  $39.08 \pm 4.97$  mg/dl respectively. LDL was  $92.59 \pm 44.54$  mg/dl and  $107.15 \pm 43.49$  mg/dl respectively. TG was  $192.33 \pm 121.06$  mg/dl and  $179.93 \pm 172.10$  mg/dl respectively (Table 5).

**Table 4: Distribution of Smoking Status in Groups**

Smoking Status	Baseline Status	After One Year	P value
<b>Compliant</b>			
Non-smoker	7 (53.8)	7 (53.8)	0.301
Ex-smoker	4 (30.8)	6 (46.2)	
Smoker	2 (15.4)	0 (.0)	
<b>Non-compliant</b>			
Non-smoker	6 (31.6)	6 (31.6)	0.554
Ex-smoker	10 (52.6)	12 (63.2)	
Smoker	3 (15.8)	1 (5.3)	

\*Chi square test was done the measure the level of significance; Figure within parentheses indicates in percentage

**Table 5: Distribution of Patients According To Lipid Profile among the Groups**

Lipid Profile at Baseline	Groups						P value
	Compliant			Non-Compliant			
	n	Mean ± SD	Mean Rank	n	Mean ± SD	Mean Rank	
T. Choleste	10	$160.05 \pm 58.67$	12.05	15	$171.47 \pm 49.53$	13.63	0.598
HDL	10	$33.05 \pm 9.55$	7.95	13	$39.08 \pm 4.97$	15.12	0.012
LDL	10	$92.59 \pm 44.54$	10.45	13	$107.15 \pm 43.49$	13.19	0.336
TG	10	$192.33 \pm 121.06$	13.90	14	$179.93 \pm 172.10$	11.50	0.412

\*Mann-Whitney U test was done the measure the level of significance

Patients in the compliant group were highly adherent to lifestyle changes. In the compliant group 100.0% cases were compliant to physical exercise and only 15.8% cases of non-compliant group were compliant and 57.9% cases were moderately compliant to physical exercise ( $P < 0.001$ ).

Patient in the compliant group used to take heart healthy diet in 100.0% cases and avoided heart-unhealthy diet in 100.0% cases as well. Whereas 63.2% patients of non-compliant group used to take heart-healthy diet and 78.9% cases avoided heart-unhealthy diet. Patients in the compliant group were also adherent to daily practice of meditation in 100.0% cases and it was only 26.7% cases in case of non-compliant ( $P < 0.001$ )(Table 6).

At the end of the study 100.0% of patients in the compliant group showed improvement of functional ability and had no limitation during ordinary activity ( $p < 0.001$ ). However, 15.4% patients had marked limitation of normal physical activity in case of non-compliant group and 21.1% patient had slight limitation to ordinary physical activity ( $p < 0.008$ ) (Table 7).

**Table 6: Distribution of Patients According To Components of Lifestyle Modification after One Year**

Variables	Groups		P value
	Compliant	Non-Compliant	
<b>Meditation Status</b>			
Compliant	13(100.0)	4(26.7)	0.001
Moderately Compliant	0(0.0)	3(20.0)	
Mild Compliant	0(0.0)	8(53.3)	
<b>Heart-Unhealthy Diet Intake Category</b>			
No Intake	13(100.0)	15(78.9)	0.128
Less Intake	0(0.0)	4(21.1)	
<b>Heart-Healthy Diet Intake Category</b>			
High intake	13(100.0)	12(63.2)	0.025
Moderate intake	0(0.0)	7(36.8)	
<b>Exercise</b>			
Compliant	13(100.0)	3(15.8)	0.001
Moderately compliant	0(0.0)	11(57.9)	
Less compliant	0(0.0)	5(26.3)	

\*Chi square test was done the measure the level of significance; \*\*Fisher’s Exact test was done the measure the level of significance; Figure within parentheses indicates in percentage

**Table 7: Distribution of Functional Disability Due To Symptoms of IHD [NYHA] in Groups**

NYHA	At Baseline	After One Year	P value
<b>Compliant</b>			
No Limitation	6(46.2)	13(100)	0.008
Slight Limitation	5(38.5)	0(0.0)	
Marked Limitation but no symptoms of rest	2(15.4)	0(0.0)	
<b>Non-Compliant</b>			
No Limitation	11(57.9)	15(78.9)	0.163
Slight Limitation	8(42.1)	4(21.1)	

\*Chi square test was done the measure the level of significance; Figure within parentheses indicates in percentage

Blood pressure and weight control was better in the compliant group (Table 8).

**Table 8: Quantitative Variables by Groups after One Year**

Variables	Groups		p value
	Compliant	Non-Compliant	
Height	165.9±4.91	165.1±6.67	0.72
Weight	67.3±7.23	66.0±10.67	0.70
BMI	24.5±2.31	24.1±2.88	0.72
Pulse(beats/min)	70.5 ±5.90	72.8±11.32	0.44
SBP1(mmHg)	122.3±10.53	132.5±14.63	0.04
DBP1(mmHg)	77.7±8.32	82.1±8.22	0.14
SBP2(mmHg)	121.5±9.66	131.4±14.53	0.04
DBP2(mmHg)	77.7±8.32	81.8±8.85	0.19

\*t test was done the measure the level of significance; Figure within parentheses indicates in percentage.

Coronary angiography was done at the baseline and at the end of the study. Gensini scoring was done to determine the regression of coronary blockage.

Regression of coronary blockage was observed in 61.5% cases of compliant group and 10.5% in non-compliant group (P<0.001). The difference was statistically highly significant (Table 9).

**Table 9: Distribution of Regress by Groups**

Regress	Groups		P value*
	Compliant	Non-Compliant	
Yes	8 (61.5)	2 (10.5)	0.005
No	5 (38.5)	17 (89.5)	
<b>Total</b>	<b>13 (100.0)</b>	<b>19 (100.0)</b>	

\*Fisher's Exact test was done the measure the level of significance; Figure within parentheses indicates in percentage.

## Discussion

In the present study 32 patients with angiographically documented coronary heart disease were motivated to make comprehensive lifestyle modification and to do regular meditation. Among them 40.62% of the patients were compliant to the lifestyle program and 59.38% were non-compliant to the lifestyle program. Patients of compliant group were highly adherent to lifestyle changes and had better functional improvement and significant regression of coronary atherosclerosis. In contrast patients of non-compliant group had insignificant functional improvement and insignificant regression of coronary atherosclerosis. It was observed that regression of stenosis was correlated with the extent of adherence of lifestyle changes as prescribed by the present study.

In the present study it was also found that patient with double vessel disease or single vessel disease had better improvement of the stenosis. But those with triple vessel disease regression was not as better as that of single or double vessel disease. Lloyd-Jones et al<sup>9</sup> showed severely stenosed patient had greater improvement.

NYHA functional class was improved in compliant significantly better (p<0.008) than noncompliant group (p<0.163). Long term reduction in NYHA functional class was also observed in a study done by Gupta et al<sup>10</sup>.

Along with other component of lifestyle changes meditation was an important component of the present study. It is the observation that meditation was responsible in building positive attitude, changing dietary habit, doing physical exercise and abstinence from risk factors like smoking. All the patient of compliant group were 100.0% cases adherence to meditation in comparison to noncompliant group which was 26.7% cases only (p<0.001). Gupta et al<sup>10</sup> had similar attitude toward meditation CAD patients in their study.

In the present study average percent diameter stenosis decreased by 26.27±23.45 in 37.5% cases in LAD, 47.9±28.22 decreased in 34.4% cases LCX and 35.75±31.17 decreased in 43.8% cases RCA. Gupta et al noted 10% absolute percent point regression in 37.4% lesions. Result of the present study is better than the study by Gupta et al<sup>10</sup>.

In the present study patients of compliant group were adherent to comprehensive lifestyle changes. They followed all the components of healthy

lifestyle. There was regression of coronary atherosclerosis in 61.5% cases of compliant group and only 10.5% cases in non-compliant group ( $p < 0.005$ ). Some study have examined the combined impact effect of lifestyle behavior in coronary artery calcinosis. These study showed that maintaining healthy lifestyle (a healthy diet, regular exercise, weight control and tobacco avoidance) was associated with a lower risk of developing coronary artery calcinosis<sup>12-13</sup>.

The present study has certain limitations. Sample size of the present study was small. Moreover, we did not determine the relative contribution of each component of comprehensive lifestyle changes in regression of atherosclerosis. We did not stop any ongoing medication.

## Conclusion

Comprehensive lifestyle modification and meditation can regress coronary atherosclerosis. Meditation has positive effect in maintaining healthy life and avoiding risk factors for coronary atherosclerosis. Lifestyle changes and meditation is feasible and well accepted by the patients with coronary atherosclerosis.

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