Role of Ayurveda-based Diet and Panchakarma Therapy on Quantitative Change in Coronary Atherosclerosis in Known CAD Assessed by Quantitative CT Coronary Angiography

ABSTRACT

Background: Ischemic heart disease (IHD), a form of coronary artery disease(CAD), is one of the many cardiovascular diseases (CVDs) whose prevalence has reached epidemic proportions. The initial symptom of coronary artery disease is the development of atherosclerotic plaques in the coronary arteries. The greatest pharmaceutical strategy to manage atherosclerosis, however, still does not seem to appear to have widespread acceptance.

Aim: To study the effect of restricted diet and Ischemia Reversal Program(IRP) panchakarma therapy on quantitative change in coronary atherosclerosis in known CAD assessed by quantitative CT coronary angiography.

Methods: A total of 17 patients suffering from CAD were administrated IRP and restricted diet program for 90 days with regular follow-ups. Basic demographics, stress test, 2D echo, and computerized tomography (CT) coronary angiography test for all the patients were recorded before and after the treatment.

Results: It was observed that 26.80% regression in Total atheroma volume(TAV), followed by 30.19% regression in high-density plaque, and 25.82% regression in low-density plaque was found in patients after the treatment. The total atheroma value is reduced by 160.7 mm ($p<0.00$). The baseline average weight of the patient decreased from 68.28 Kg to 63.97 Kg ($p<0.02$).

Conclusion: IRP can help to stabilize the plaque for a longer lifespan in addition to decreasing the development of atherosclerosis when combined with a limited diet. The results of our study indicate that IRP Panchakarma therapy, in conjunction with restricted diet programs, can be used to treat individuals with coronary atherosclerosis who have known coronary artery disease as measured by quantitative CT angiography.

Keywords: Coronary artery disease; atherosclerotic plaque; ischemia reversal program.

1. INTRODUCTION

The prevalence of cardiovascular diseases (CVDs), which include ischemic heart disease (IHD), a kind of coronary artery disease, has risen to epidemic levels. The cause of approximately 17.5 million deaths worldwide is CVDs [1,2]. It is alarming to note that only developing nations account for three-quarters of these fatalities.2 While CVD-related mortality is down in affluent nations, it is still a problem in emerging nations like India, which makes the situation worse [3]. Plaque disruption with superimposed thrombosis is the primary cause of the acute coronary syndromes of unstable angina, myocardial infarction, and sudden death [4]. Coronary atherosclerosis is by far the most common cause of ischemic heart disease [5].

An increased prevalence of epidemiological transition, which includes urbanization, lifestyle changes, and other factors, is suggested by earlier publications in the literature [6]. A sedentary lifestyle causes illnesses like lipid abnormalities, diabetes, IHD, and hypertension (HTN), all of which contribute to increased morbidity and mortality in India as well as rising

healthcare expenses. India is currently experiencing an era of obesity and inactivity.7 Furthermore, retrospective investigations have demonstrated that the majority of atherosclerotic plaques causing future acute coronary syndromes are angiographically mild, [8] and the mechanisms that contribute to severe adverse cardiovascular events connected to lesions are poorly understood. The development of atherosclerotic plaques in the coronary arteries is the first sign of coronary artery disease [8].
The fatalities related to CAD are predicted to increase from 2.26 million to 4.77 million fatalities per year in India [9]. This increases the financial load on the nation and calls for the creation of efficient and effective treatment options. The use of statins, -blockers, angiotensin-converting enzyme (ACE) inhibitors, antithrombotic medications, reduction of risk factors, effective use of estrogen, and antioxidants are only a few of the methods that have been suggested to slow the progression of atherosclerosis [10]. The greatest pharmaceutical strategy to manage atherosclerosis, however, still does not seem to appear to have widespread acceptance [11]. Various therapeutic approaches for increasing the functional ability and quality of life in patients with cardiovascular illnesses are mentioned in classical Ayurvedic writings [12]. Ayurveda is the foundation of Indian traditional medicine, and it has been adopted by many alternative physicians to treat a variety of ailments [13].

One such integrated method of treating CAD patients is the administration of the Ischemia Reversal Program (IRP), which includes panchakarma treatment and a healthy diet. Even though doctors utilize it successfully in practice, there is not enough systematic scientific evidence to support it. Although previous studies that have panchakarma treatment have evaluated its effect on CAD using parameters such as ejection fraction, lipid levels, mortality etc. [14-17]. No study of our knowledge documents a combination of panchakarma techniques with restricted diet to evaluate plaque characteristics in patients with CAD. Therefore, the goal of this study is to evaluate the efficacy of restricted diet, lifestyle modification, and panchakarma therapy on plaque quantification in patients with CAD.

2. METHODS

This is a single-center observational study screened patients suffering from CAD (positive for inducible ischemia from stress test) of any gender and age who had attended the out-patient department of Madhavbaug clinic, Amravati between January 2020 and December 2021 for 90 days.

Inclusion criteria: The patients who were suggested for angioplasty or had undergone angiography. Patients with ischemia grading 2 and 3, chest pain, high lipid levels, hypokinesia, and stress test positive were included in the study. Patients with CAD associated co-morbidities such as diabetes mellitus and hypertension were also included.

Exclusion: The patients having ejection fraction< 25, serum creatinine >2.6, and grade 4 dyspnoea were excluded from the study.

Basic demographics, stress test, 2D echo, and computerized tomography (CT) coronary angiography test for all the patients were recorded.

2.1 Intervention

Ischemia Reversal Process(IRP) [14]- The IRP therapy consists of three steps:

a) *Snehana* (Oleation) - It involves oil massage with Sesame and Lavender oil.

b) *Swedana* (Thermal vasodilation) – It is passive heat therapy done by *Dashmoola* (group of ten herbal roots) with steam at <40 degrees Celsius).

c) *Basti* (Per rectal drug administration) – It is a decoction therapy of medicated herbs (Tribulusterrestris, Curcuma longa, Phyllanthusemblica) administered to the patient by the rectal route. Yapan basti was used in this study.

2.2 Reverse Diet kit [15]

A low calorie (1000kcal), low carbohydrate (40 percent of total calories), moderate fat, high antioxidant capacity (>50,000 Oxygen Radical Absorbance Capacity (ORAC) value), moderate protein diet, and diet with the best source of vitamin C (500 mg per day), enhanced with vitamin E designed specifically for CAD patients (20 percent of total calories) was administrated to all the patients for 90 days with regular follow-ups.
The diet kit consists of Madhavprash, Cardiac Tea, Mutiya mix, Soy dhokla mix, Rajma flour dosa, Atta mix, Lentil Daal mix, Herbs masala mix, Chutney mix, Nuts mix bar, and Kokum soup mix.

The total duration of intervention for each patient was 3 months wherein the diet and IRP interventions were carried out simultaneously. The patients continued their allopathic medication and were prescribed additional Ayurveda medications. The tapering of allopathic medication was done post necessary demographic and biochemical analysis.

Statistical Analysis: The information collected was compiled and organized using Microsoft Excel software. The data were then analyzed using R Version 3.4.1 software. Categorical data were presented in frequency format, while continuous data were expressed as percentages and Mean±SD. To evaluate the differences between baseline measurements and those taken on the 90th day following treatment, the Paired t-test was employed.

3. RESULTS

The effect of restricted diet and IRP panchakarma therapy was studied on a total of 17 patients with coronary atherosclerosis in known CAD assessed by quantitative CT coronary angiography. The changes observed in basic demographic characteristics were given in Table 1. Out of 17 patients, 11 patients (64.71%) were male. The mean age of the patients is 56.35±8.97.

It was observed that 26.80% regression in Total atheroma volume(TAV), followed by 30.19% regression in high-density plaque, and 25.82% regression in low-density plaque was found in patients after the treatment. The total atheroma value is reduced by 160.7 mm ($p<0.00$). The baseline average weight of the patient decreased from 68.28 Kg to 63.97 Kg ($p<0.02$).

4. DISCUSSION

The main factors that promote vascular inflammation include hypertension, diabetes mellitus, smoking, and stress. The atheroma that forms when an inflamed coronary tries to mend itself may go away if the process of inflammation is stopped over time, but there lies a chronic phase of inflammation that causes progressive atherosclerosis.

Table 1. Demographic and plaque characteristics of the study patients before and after the treatment

Variable	Before treatment	After treatment	P value
Weight	72.27±17.01	63.97±8.49	NS
ABG	95.32±9.33	89.33±11.56	p=0.01
SBP	120.59±10.56	123.65±14.67	NS
DBP	78.82±4.71	77.59±6.43	NS
HR	73.53±10.38	74.59±11.94	NS
Total Fibro fatty (Plaque 1)	86.55±73.20	64.52±70.24	NS
Total Fibrotic (Plaque 2)	464.71±247.58	324.38±201.04	p=0.0001
TAV	599.54±290.02	438.84±245.14	p=0.0001
Total Calcium	48.28±77.54	49.93±63.90	NS
HbA1c	7.24±1.33	6.35±0.85	NS
LDL	87.73±31.61	72.62±22.75	NS
HDL	40.79±11.59	37.74±6.34	NS
TG	156.45±110.46	134.85±39.39	NS
TC	159.94±44.60	136.49±26.72	p=0.05

ABG: Abdominal Girth, DBP: Diastolic Blood Pressure, HbA1c: Glycated haemoglobin, HDL: High-Density lipoprotein, HR: Heart rate, LDL: Low-density lipoprotein, SBP: Systolic blood pressure, TAV: Total atheroma volume, TC: Total cholesterol, TG: Triglycerides, NS: Non-Significant

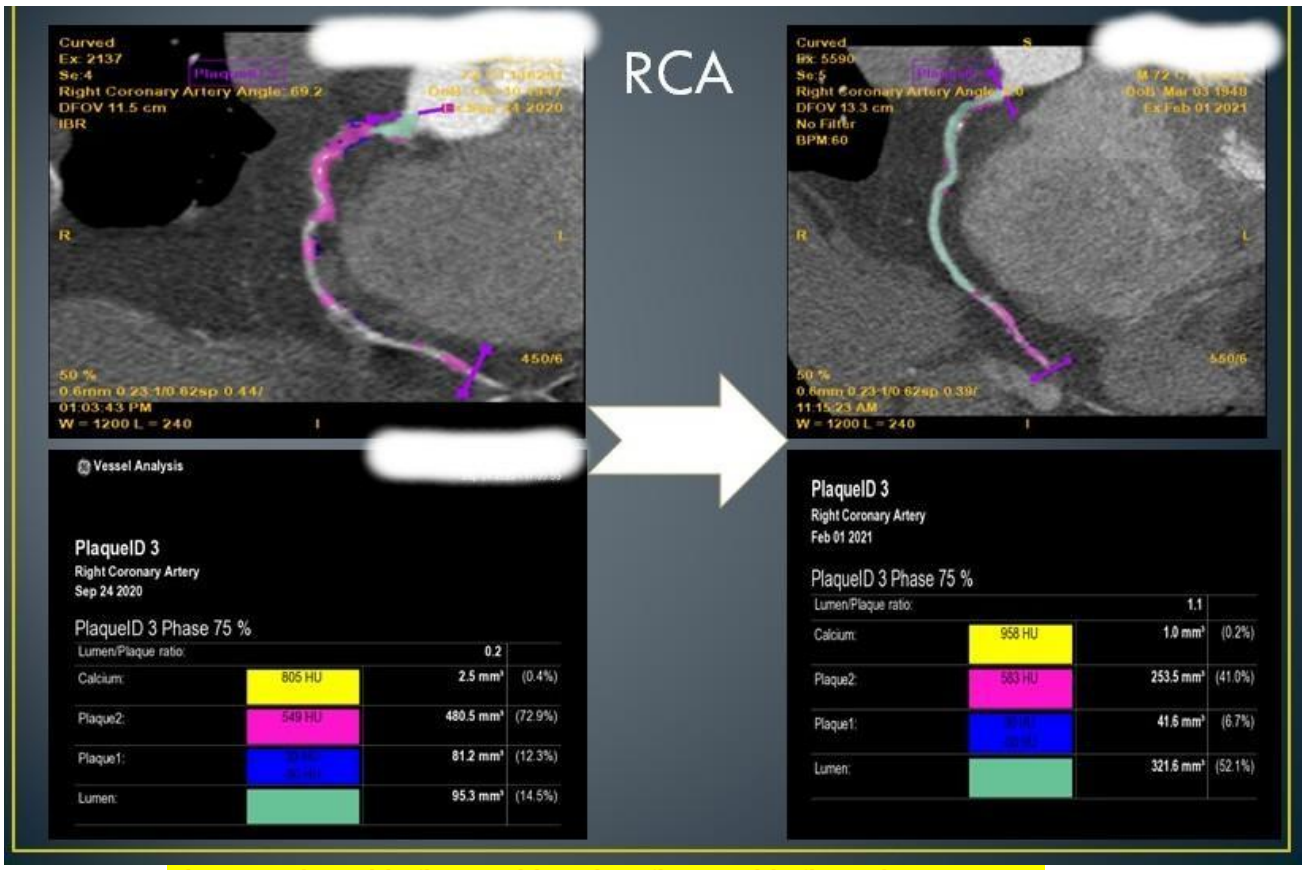

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Fig. 1. Representative image CT coronary angiography of plaque reduction after the treatment

Table 2. Reduction of allopathic medicines

Medicines	Day 1	Day 90	Medicines Tapering%
Calcium channel blockers	1	0	-100
Beta-blockers	9	5	-44.44
Vasodilators	3	1	-66.67
Diuretics	4	2	-50
Nitrate	8	1	-87.5

One of the current therapeutic problems is the potential for slowing or perhaps causing the regression of human atherosclerosis. Thus, here we have introduced the Ayurvedic approach to the treatment of coronary atherosclerosis. Patients with coronary atherosclerosis and known CAD as determined by quantitative CT coronary angiography were investigated to determine the effects of restricted diet and IRP panchakarma therapy. The low-calorie Reverse Cholesterol Diet can prevent and treat insulin resistance as well as the anabolic insulin surge. Patients with stable ischemic heart disease may see a considerable improvement in quality of life thanks to the IRP, which may increase blood supply to the myocardium and hence minimize angina symptoms [18].

The weight, ABG, SBP, DBP, and HR of all the patients improved after the treatment. Total1`wa. fibrofatty (Plaque 1), total fibrotic (Plaque 2), TAV, and total calcium were found to be reduced after the treatment to a greater extent as observed by CT Coronary angiography. Interestingly, it was observed that low-density plaque has regressed more as compared to high-density plaque. The plaque which we have managed is stabilized plaque and this is the reason we observed less or no hospitalization and mortality. A quantitative approach to CT

angiography may aid in understanding plaque features as well as plaque volume. Low grade (less radiopaque Hounsfield unit (HU)<350) is thought to be a fragile plaque, whereas HU>350 is seen to be a stable plaque. The basic Ayurvedic principle's value in the stabilization and regression of atherosclerotic plaque has been highlighted by this study.

Decoction used for IRP include Tribulus terristris, curcumin and Phyllanthrus embelica can be helpful for nitric oxide liberation from endothelium. Along with it can be anti-inflammatory and antioxidant. This action may be helpful in improving coronary circulation by causing coronary vasodilation [19-24].

In a previous study, the use of a reverse diet kit resulted in a 50% decrease in LDL levels from their initial value, while also causing a 7% increase in HDL levels. HDL aids in the transportation of cholesterol from peripheral cells to the liver, where it is metabolized, thereby lowering the risk of cardiovascular disease and major coronary events. Overall, the intervention of the reverse diet kit led to a significant reduction of cholesterol levels by approximately 62% in the patient [19]. Additionally, in a past case study, the effects of a reverse diet kit on a patient's weight and plaque calcium volume were evaluated. The study observed a weight loss of nearly 12%, as well as a significant reduction in total atheroma by approximately 52% [25].

In our study, we also found that IRP and restricted diet regimens reduced patients' reliance on conventional medications. This discovery is especially significant for populations like those in India, where unfavourable side effects and higher treatment costs significantly lower compliance and adherence, raising the risk of coronary artery disease [9].

Despite all of these noteworthy good results of IRP treatment and restricted diet programs, we advise further research with a bigger sample size so that the results of our study can be confirmed and extrapolated to larger populations.

5. CONCLUSION

The findings of our study suggest that IRP Panchakarma treatment along with restricted diet programs can serve as treatment for patients with coronary atherosclerosis in known CAD assessed by quantitative CT Coronary angiography. IRP along with a restricted diet can aid to stabilize the plaque for a longer lifespan in addition to slowing the progression of atherosclerosis. Another advantage is that it considerably lessens patients' dependence on allopathic treatments.

CONSENT

Informed consent from each participant was registered

ETHICS APPROVAL

Institutional review board approval and in compliance with the ethical standards of the responsible institution on human subjects as well as with the Helsinki Declaration

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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