ADITUM

Journal Of Clinical Cardiology Interventions

Open Access Case Report

Effect of Reverse Diet Kit on Regression of Atheroma in a Patient with Coronary Artery Disease: A Single Case Experimental Study

Sane Rohit[1], Mandole Rahul[2*], Dr Gurudatta Amin[3]

[1]Madhavbaug Clinics and Hospitals Mumbai

[2]Head of Research and Development, Madhavbaug Clinics and Hospitals Mumbai

[3]M.D in Ayurveda, Head of Medical Department, Madhavbaug Clinics and Hospitals Mumbai

Article Info

Received: March 25, 2021
Accepted: April 01, 2021
Published: April 06, 2021

***Corresponding author:** Mandole Rahul, Head of Research and Development, Madhavbaug Clinics and Hospitals Mumbai.

Citation: Rohit S, Rahul M, Amin G. (2021) Pilot Study on Analgesia by Continuous Blockade of The Erector Plane of the Spine After Cardiac Surgery. J Clinical Cardiology Interventions, 2(2); DOI: http;//doi.org/04.2021/1.1012

Abstract

Diet that maintains glycemic index and has high antioxidants might seize the progression coronary artery disease (CAD) in patients with diabetes. Impact of low calorie, high antioxidant food from reverse diet kit (12-week regime) in a 51-year-old CAD patient with diabetes is studied here. The reverse diet kit (RDK) contained pre-portion ready to cook food products that fulfil daily requirements of all mealtimes. Primary assessments: serum blood sugar levels and plaque characteristic changes determined by coronary CT angiography (CTA) at 12-weeks vs. baseline. Weight reduction of 9kg at the end of RDK intervention was observed. Blood sugar levels decreased significantly from 250mg/dl to 109mg/dl. A change of 124mm^3 in total atheroma plaque volume (TAV) post-intervention vs. baseline was observed in four major arteries. The mean (SD) of TAV at baseline in LAD, LCX, and RCA (mm^3) was found to reduce from 128.5, 98.5 and 381.1 to 113.7, 53.7 and 316.4 respectively. A clinically notable impact of RDK viz. good glycemic control and reduced plaque volume at 12-week is seen in CAD patient with diabetes.

Key Words: reverse diet kit; coronary artery disease; ct angiogram; total atheroma volume

Aim:

The study aimed to analyse the impact of a low calorie, high antioxidantfood from reverse diet kit on the determinants of CAD progressionafter a 12 week follow up study in a patient with CAD and diabetes.

Objectives:

1. To evaluate the effect of reverse diet kit on total atheroma volume (TAV) as assessed by coronary CT angiography (CTA) and changed dosages of concomitant medications
2. To assess the change in weight, blood pressure, pulse rate, serum blood sugar levels, calcified and non-calcified plaque volume, calcium score, and calcium volume atthe baseline vs post-completion of the reverse diet programme for 12 weeks

Background:

There has been a rapid emergence of literature that underline diabetes and CAD associated events. This led to a growing consensus on the number of common precursors shared by them, which are metabolically linked and are often known to occur together in the same individual.[1,2] Cardiovascular risk factors such as obesity, hypertension, dyslipidemia, physical inactivity, which are also common in patients with diabetes are implicated to play a major role in plaque formation. .[3] Impairedglycemic control is another feature which is known to cause an increased risk of cardiac events in diabetic patients.However, several studies have shown that oxidative stress is the important pathogenic link between inflammation and atherosclerosis, especially in the setting of obesity and associated co-morbidities

of diabetes.[4] It is found that pathophysiological events due to oxidative stress within the arterial wall leading to the development of atherosclerosis and further amplified by obesity-induced adverse alterations in the adipose tissue.[4,5] Atherosclerosis begins with the retention of LDL in the vessel with subsequent oxidative modification of LDL and leads to the formation of foam cells. This further triggeran inflammatory cascade, and plaque progression. The above molecular and cellular events thus promote atheroma formation by incorporation ofdendritic cells and T cells into the lumen by adhesion molecules. Thus,in the arterial wall, the detrimental effect ofinflammation and oxidative stress synergize to accelerate the progression ofatheroma plaque formation.[5]

Treatment modalities viz. drug therapies and surgical interventions, used to treat theseconditions, areoften associated with higher procedural risk and poorer long-term outcomes.[6] These therapies thus prove to be inadequate, as they fail to address the most proximal determinants for progression of atherosclerotic CAD, which includes poor-quality diet patterns, unhealthy lifestyle choices,physical inactivity, and obesity. [7,8]

We, therefore, hypothesized that even though medications form the cornerstone treatment for CAD and diabetes management, nutritionally balanced and energy-controlled diet kit along with regular exercise might support in combating the disease progression.

This case reportis a 12-week follow up experiment demonstrating the impact of a scientifically designed diet box, 'reverse diet kit' on CAD progression. The kit contains pre-portion food products that fulfil the daily requirement of breakfast, lunch, dinner, soup and early morning diet options.

Case Presentation:

A 51-year-old male with a known history of diabetes for 10-11 years, had an acute coronary event on 30th October 2019, further investigation with angiography on the same day suggested Triple Vessel Disease(TVD) with 80-100% narrowing in all three epicardial branches of the coronary artery. The patient was advised acoronary artery by-pass graft (CABG). The patient refused for immediate surgery and was discharged. He opted for dietary modification. Before going through this intervention,we decided to perform Coronary CTA with plaque volumetric analysis.The patient was fully informed of the objectives, potential risks and discomforts of the study in his first language following which he provided written informed consent to participate.

Coronary CTA has emerged as an effective and promising non-invasive imaging modality to diagnose CAD.[9,10] It allows evaluation of coronary plaque burden and its compositions.[11] This further has important clinical implications, with a significant association of plaque components with the prediction of adverse cardiac events and prognosis.[12] Although IVUS is considered to be the gold standard for the assessment of the distribution and severity of coronary plaque composition,[13] it is an invasive procedure which may not be suitable for every patient or isn't commonly performed in routine clinical practice and thus may be limited to research studies.However, head to head comparison of coronary CTA with IVUS in a meta-analysis review by Fischer C et al. presented a high correlation between total plaque volumes, plaque area, percentage of area stenosis, within the overall cohort in forty-two studies that evaluated 1360 patients depicting no significant differences between the two methods.[14]

Comparison between coronary CTA and IVUS, confirms the diagnostic accuracy of CTA in the quantitative assessment and characterisation of coronary plaque volume. Therefore, the current study used CTA as an imaging technique.

Method of coronary CTA and its reporting: In the present study, to determine the pre and post plaque volume of the three major branches of the coronary artery, coronary CTA was performed. Coronary CTA was done after IV injection of non-ionic contrast using ECG gating.

All post-processing of coronary CTA data was performed by imaging experts who were familiar with cardiac anatomy and pathology using dedicated software. Initially, the source images (i.e. raw data) were reconstructed using the data acquisition algorithm. The resulting transverse (i.e. axial) images were then subjected to post-processing techniques like *m*aximum intensity projections (MIP), *m*ulti-planar reformations (MPR), curved MPR and *v*olume rendering technique (VRT) reformations.

Metabolic assessment: The baseline (on enrolment/ before starting diet intervention) patients' anthropometric measurements were noted down. Laboratory assessments like blood sugar levels, blood pressure and heart ratewere carried out. Total atheroma volume, calcified and non-calcified plaque volume, lumen volume, length of the artery and artery volume and calcium volume were measuredusing coronary CT angiography. Change in atheroma volume was also calculated.

The patient was prescribed with Atorvastatin (10mg), Clopidogrel (75mg), Aspirin (75mg), 5mg of isosorbide dinitrate, glimepiride and metformin in 500 mg and 1 mg combination at the beginning of the reverse diet kit intervention. Thereafter, the patient was started on a 12-week intervention wherein along with the prescribed medicines, he was asked to incorporate an antioxidant-rich, anti-inflammatory and low-caloriedieti.e. a scientifically designed'reverse diet kit' in his daily routine.Over the 12-week study, the patient followed a weekly diet plan (Table 1) which was prepared as per his calorific requirements. A well-designed diet plan allowed to carefully control the energy and macronutrient requirements (Table 2) of the patient.

Daily Nutrition Fact Label of Reverse Diet Kit		
Sr. No.	Nutrition Factor	Contents
1	Calories	1000 Kcal
2	Carbohydrates (Low insulin provoking & low Glycemic index carbohydrates)	40%of total calories
3	Proteins (Moderate protein)	20 % of total calories
4	Fats	40%of total calories
5	Vitamin C	1 g per day
6	Vitamin E	Fortified
7	Potassium	4700 mg
8	Omega 3 Fatty Acid	Q. S.
9	Low sodium	Q. S.
10	Garlic	Q. S.
11	Ginger	Q. S.

Time/ Menu	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Table 1: The nutrition facts label of Reverse Diet Kit

Early Morning	1 tsp of Madhavprash	1 tsp of Madhavprash	1 tsp of Madhavprash	1 tsp of Madhavprash	1 tsp of Madhavprash	1 tsp of Madhavprash	1 tsp of Madhavprash
	If Non-Vegetarian please include boiled egg whites						
Breakfast 8:00am	1 Cup cardiac tea	1 Cup cardiac tea	1 Cup cardiac tea	1 Cup cardiac tea	1 Cup cardiac tea	1 Cup cardiac tea	1 Cup cardiac tea
	Muthiya mix (5-6 small Steam Balls)	Soy dhokla mix (3-4 Medium pcs)	2 small Rajma Flour Dosa	Soy dhokla mix (3-4 Medium pcs)	Muthiya mix (5-6 small Steam Balls)	Soy dhokla mix (3-4 Medium pcs)	2 small Rajma Flour Dosa
	2 Tsp green chutney	2 Tsp green chutney	2 Tsp green chutney	2 Tsp green chutney	2 Tsp green chutney	2 Tsp green chutney	2 Tsp green chutney
Mid Morning 11 am	1 medium fruit	1 medium fruit	1 medium fruit	1 medium fruit	1 medium fruit	1 medium fruit	1 medium fruit
	With lunch and dinner include 1 tsp of chutney						
Lunch 1.00pm	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon
	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka
	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable
	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal
	If eats non-vegetarian please include grilled or steam 3-4 small pc chicken/fish						
Mid evening at 4.30 pm	1 cup cardiac tea	1 cup cardiac tea	1 cup cardiac tea	1 cup cardiac tea	1 cup cardiac tea	1 cup cardiac tea	1 cup cardiac tea
	1 vati nut mix chiwda+ 1tspMadhavprash	1 vati nut mix chiwda+ 1tspMadhavprash	1 vati nut mix chiwda + 1tspMadhavprash	1 vati nut mix chiwda+ 1tspMadhavprash	1 vati nut mix chiwda+ 1tspMadhavprash	1 vati nut mix chiwda+ 1tspMadhavprash	1 vati nut mix chiwda+ 1tspMadhavprash
6.30 pm evening	1 bowl tamarind soup	1 bowl tamarind soup	1 bowl tamarind soup	1 bowl tamarind soup	1 bowl tamarind soup	1 bowl tamarind soup	1 bowl tamarind soup
Dinner 8 pm	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon	1 bowl salad + pc of lemon
	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka	2 small fulka
	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable	1 katori vegetable
	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal	1 katori lentil daal

Table 2: Diet chart- weekly Plan

Diet: Carbohydrate recommendations via reverse diet kit focused on low glycaemic index sources as it helps in weight loss, reduction of inflammation, reduction of triglycerides and high-density lipoproteins and thus helps in the improvement of vessel health. The diet also consisted of foods rich in omega 3 fatty acids, vitamin A, vitamin C and vitamin E. Reverse diet kit had high Oxidative Radical Absorption Capacity (ORAC) unit i.e. 64,000 per day which will keep the antioxidant system of the body switched on for 24 by 7.

To encourage a reduction in weight through a combination of decreased energy intake and increased energy expenditure, along with the diet, less aerobic exercise regime was designed and he was instructed to walk daily. Adjustments in nutritional intake and the intensity of exercise performed during the intervention were kept in check daily to accommodate the target energy deficit, which was set according to the rate of body composition change over the 12-week study.

Daily monitoring was the critical factor of the study wherein the patient was asked to share pictures of his diet plate to track the partition size and other details of his breakfast, lunch and dinner.

Our dietician was continuously in touch with the patient to accomplish a hundred per cent compliance to diet and lifestyle. Weight was measured every day and blood pressure was recorded before and after the walking regime. Furthermore, blood sugar levels were analysed within a span of every three days. Total atheroma volume, calcified and non-calcified plaque volume, lumen volume, length of the artery and artery volume and calcium volume were then assessed again at the end of week 12 using coronary CT angiography.

Results: Overall, the 12-week intervention of reverse diet kit in combination with exercise contributed to the holistic well-being of the patient. Demographic and biochemical data of the patient from baseline to latest is depicted in Table 3. After the end of the 12-week, there was a noteworthy reduction by 9kg in the weight of the patient. Blood sugar levels were found to decrease from 250ml/dl to 109mg/dl and also blood pressure dropped from

Demographic & Biochemical Parameter	Before	After	Change	Percentage Change %
Weight (kg)	78	69	9	11.54↓
BMI (kg/m^2)	30.1	26.6	3.5	11.63↓
SBP (mmHg)	170	118	52	30.59↓
DBP (mmHg)	80	78	2	2.5↓
Blood Glucose (mg/dl)	250	109	141	56.4↓

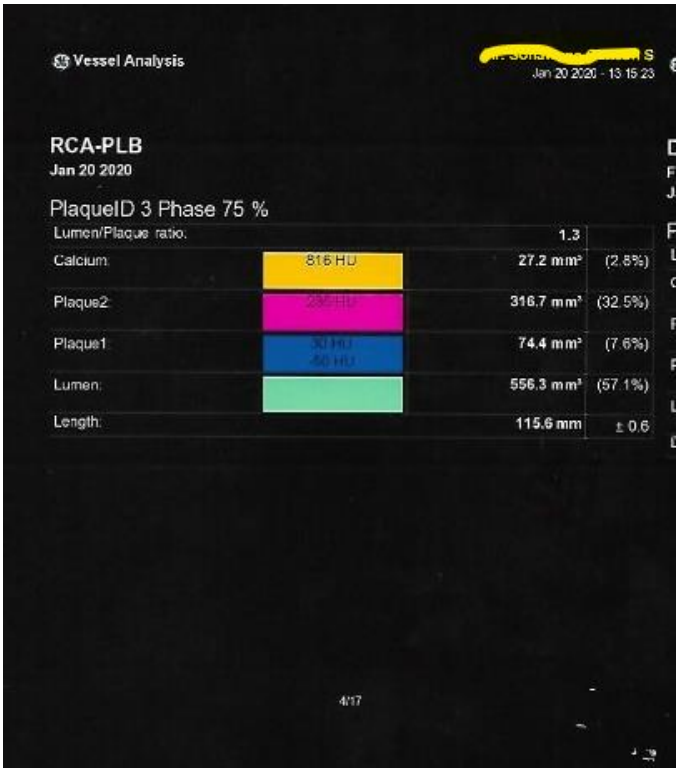
170/80mmHg to 52/3mmHg.

Table 3: Demographic and Biochemical data of the patient from baseline to the latest

Sr. No.	Branch of Coronary artery	Before (mm3)	After (mm3)	Change (mm3)	Percentage Change (%)
1.	LAD	128.5	113.7	14.8	11.52↓
2.	LCX	98.5	53.7	44.8	45.48 ↓
3.	RCA	381.1	316.4	64.7	16.98 ↓
4.	Total Atheroma Plaque Volume (TAV)	608.1	484.1	124	20.39 ↓

However, clinically significant observation of the present study was a change of 124mm^3 in total atheroma plaque volume (TAV) whereinthe mean (SD) baseline value of 608.1mm3 declined to 484.1mm3 (20.39% decrease as compared with baseline). Furthermore, after the follow-up period, the percentage reduction in plaque volume of coronary artery branches: LAD, LCX, and RCA were 11.52, 45.48, and 16.98respectively. The value change in total atheroma volume from baseline to the latest is depicted in Table 4 and the regression of total atheroma volume is shown in Figure 1.

A. Pre treatment



B. Post treatment

Figure 1: Change in angiographic characteristics through baseline to week 12 depicted by CTA results

Recorded changes in the calcium volume, calcified and non-calcified plaque volume, lumen volume and strength of the artery from baseline to the end of 12th week is depicted in Figure1. In this patient the calcium volume at baseline in LAD, LCX, RCA, and the whole heart was 32.4%, 16.5%, 54.4% and 103.4%, respectively and post-intervention was 63.1%, %, 27.2%, and 67.9%, respectively. Moreover, the percentage change in calcium volume concerning whole heart was found to reduce significantly from 18.4% to 10.3% whereas LCX value was found to reduce from 4.9% to 0.3% and RCA from 6.2% to 2.8%. Similarly, the percentage change in calcified and non–calcified plaque volume in LAD, LCX, RCA and whole heart was found to reduce wherein significant reduction was noted in RCA which reduced from 9% to 7.6%. Apart from the above changes, there was a significant tapering of ~90% in the medicines consumed by the patient atbaseline: Atorvastatin (10mg), Clopidogrel (75mg), Aspirin (75mg), 5mg of isosorbide dinitrate, glimepiride and metformin in 500mg and 1 mg combinationwhile at the end of the week the only medication that the patient used wasT. Glimipride.

Discussion:

Atheroma is a multifaceted process that is associated with factors, such as wall shear stress, calcium volume,coronary calcium inflammation, endothelial dysfunction. [15,16] Recent studies have shown that changes in coronary plaque volume and lumen diameter have led to new insights into the risk stratification related to disease progression.[17]

In the present study,carbohydrate recommendations via the reverse diet kit, focused on low glycaemic index sources as it helps in weight loss, reduction of inflammation, reduction of triglycerides and high-density lipoproteins thereby aiding the improvement of vessel health. However, the role of statins (or

lipid lowering drugs) to induce actual regression in atheroma burden was elusive till theASTEROID trial. The trial was successful in showing statistically significant regression in atheroma burden due to statin administration as assessed by IVUS.[6] Current case report shows an interesting outcome wherein there is significant regression in total atheroma volume and at the same time the patient was off statin therapy post 100% compliance to the reverse diet kit described in this study.

On the other hand, oxidative stress is known to initiate a cascade of vascular events like endothelial dysfunction, inflammation, and thrombus formation which further leads to atheroma progression. [18,19] Therefore the patient was provided with vitamin A, vitamin C and vitamin E rich sources that increased his anti-oxidant capacity to kill toxic product generated; like pro-inflammatory products and free radicals. Vitamin C is known to reduce vessel damage by providing adequate collagen synthesis and improving immunity. Vitamin E is also known to reduce oxidation and maintain the health of vessels. Several large-scale clinical studies have observed that an increased antioxidant level is an important factor in limiting the risk of cardiovascular events associated to CAD.[20] High dietary intakes of vitamin C, vitamin E and beta-carotene are associated with a lower risk of CAD and showcase improved life expectancywhich is supported by increasing evidence from trials using antioxidant supplements.[21]In a randomized, controlled clinical trial performed on a total of 2002 patients with angiographically-proven CAD, it was observed that with an overall risk reduction of 47%., the combined end-point of non-fatal myocardial infarction and cardiovascular death, was prevented with vitamin E supplementation.[22]

The diet consisted of foods rich in omega 3 fatty acids to help reduce the production of inflammatory products and the process of inflammation. [23]

One potential reason why there was a significant reduction in the parameters associated with CAD progression might be due to the additional properties of the reverse kit diet food which consists ofhigh Oxidative Radical Absorption Capacity (ORAC) unit i.e. 64,000 per day. The daily requirement of a normal individual is 12000 ORAC unit whereas conventional food can serve 3000-4000 ORAC value.

Food prepared using reverse diet kit helped the antioxidant system of the patient to be active. The kit had added advantage that reduced endothelial dysfunction and cessation of atherosclerotic plaque progression. Daily intake of 1000Kcal diet made the patient calorie deficit. Ultimately to meet the normal requirement of 1500 Kcal/ day, body fats were utilised that lead to a reduction in visceral obesity. The antioxidant and anti-inflammatory action of foods rich in omega 3 fatty acids may have helped in activating cholesterol reversal transport system and in turn reduced plaque volume from its baseline.

Furthermore, foods like pomegranate, garlic and fibre rich low carbohydrate food enhanced the defence mechanism against pro-inflammatory products, inflammation [24] and led to the reversal of progressing disease. It also helped in increased blood flow and a reduction in plaque formation.

The diet kit being anti-inflammatory and having high anti-oxidant capacity might have helped in the reversal of disease progression, and thereby improved vessel health, reduced plaque volume and improved blood flow. Reverse diet kit thus led to atheroma regression to a significant level and also enabled tapering of concomitant medications through diet management.

Conclusion: This single case report has shown a notable decrease in CAD progression and diabetes determinants. This promising outcome of the use of Reverse Diet Kit needs to be underlined in a larger blinded trial which may make the diet kit a complementary therapy to the mainstream allopathy.

Acknowledgment: Authors would like to acknowledge Madhavbaug Clinic for the recruitment of the patient for the study and other technical support required for the study. Authors also acknowledge Dr SandhyaNambiar for writing assistance and Ms PoonamPawar for additional editorial support.

Conflict of Interest: The authors declare that the content of this paper has not been published elsewhere and is not currently under consideration by any another journal or publisher. The paper's publication content has been approved by all the other co-authors and declare that there is no conflict of interest.

References:

1. Rewers M, Zaccaro D, D'Agostino R, Haffner S, Saad MF, Selby JV, et al. (2004). Insulin sensitivity, insulinemia, and coronary artery disease: The Insulin Resistance Atherosclerosis Study. Diabetes Care;27(3):781-7.
2. Roberts CK, Hevener AL, Barnard RJ. (2013). Metabolic syndrome and insulin resistance: underlying causes and modification by exercise training. Compr Physiol;3(1):1-58.
3. Leon BM, Maddox TM. Diabetes and cardiovascular disease: Epidemiology, biological mechanisms, treatment recommendations and future research. World J Diabetes2015;6(13):1246.
4. Steinberg D. (2009). The LDL modification hypothesis of atherogenesis: an update. J Lipid Res;50(Supplement): S376-81.
5. Gofman JW, Lindgren F, Elliott H, Mantz W, Hewitt J, Strisower B, et al. (1950). The role of lipids and lipoproteins in atherosclerosis. Science. 111(2877):166-86.
6. Nissen SE, Nicholls SJ, Sipahi I, Libby P, Raichlen JS, Ballantyne CM, et al. (2006). Effect of very high-intensity statin therapy on regression of coronary atherosclerosis: the ASTEROID trial. JAMA;295(13):1556-65.
7. Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. (2012). AHA statistical update. Heart disease and stroke statistics–2012 Update. A report from the American Heart Association. Circulation. 125(1):e2-20.
8. Sunar H, Halici Ü, Canbaz S, Yavuz E, ÖzcanGü, Duran E. (2003). Effect of obesity on coronary artery bypass surgery. Gulhane Medical Journal;45(4).
9. Budoff, M.J., Dowe, D., Jollis, J.G., Gitter, M., Sutherland, J., Halamert, E., et al. (2008). Diagnostic performance of 64-multidetector row coronary computed tomographic angiography for evaluation of coronary artery stenosis in individuals without known coronary artery disease: results from the prospective multicenter ACCURACY (Assessment by Coronary Computed Tomographic Angiography of Individuals Undergoing Invasive Coronary Angiography) trial. J Am Coll Cardiol;52(21):1724-1732.
10. Sun Z, Choo GH, Ng KH. (2012). Coronary CT angiography: current status and continuing challenges. Brit J Radiol;85(1013):495-510.

11. Foster G, Shah H, Sarraf G, Ahmadi N, Budoff M. (2009). Detection of noncalcified and mixed plaque by multirow detector computed tomography. Expert Rev Cardiovasc Ther;7(1):57-64.
12. Carità P, Guaricci AI, Muscogiuri G, Carrabba N, Pontone G. (2018). Prognostic value and therapeutic perspectives of coronary CT angiography: a literature review. Biomed Res Int;2018.
13. Batty JA, Subba S, Luke P, Gigi LW, Sinclair H, Kunadian V. (2016). Intracoronary imaging in the detection of vulnerable plaques. Curr Cardiol Rep;18(3):28.
14. Fischer C, Hulten E, Belur P, Smith R, Voros S, Villines TC. (2013). Coronary CT angiography versus intravascular ultrasound for estimation of coronary stenosis and atherosclerotic plaque burden: a meta-analysis. J Cardiovasc Comput Tomogr 7(4):256-266.
15. Corban MT, Eshtehardi P, Suo J, McDaniel MC, Timmins LH, Rassoul-Arzrumly E, et al. (2014). Combination of plaque burden, wall shear stress, and plaque phenotype has incremental value for prediction of coronary atherosclerotic plaque progression and vulnerability. Atherosclerosis 232(2):27127-6.
16. Han D, Starikov A, ó Hartaigh B, Gransar H, Kolli KK, Lee JH, et al. (2016). Relationship Between Endothelial Wall Shear Stress and High-Risk Atherosclerotic Plaque Characteristics for Identification of Coronary Lesions That Cause Ischemia: A Direct Comparison with Fractional Flow Reserve. J Am Heart Assoc;5(12):e004186.
17. Zaromytidou M, Antoniadis AP, Siasos G, Coskun AU, Andreou I, et al. (2016). Heterogeneity of coronary plaque morphology and natural history: current understanding and clinical significance. Curr Atheroscler Rep;18(12):80.
18. Leopold JA, Loscalzo J. (2009). Oxidative risk for atherothrombotic cardiovascular disease. Free Radic Biol Med;47(12):1673-1706.
19. Lubos E, Loscalzo J, Handy DE. (2011). Glutathione peroxidase-1 in health and disease: from molecular mechanisms to therapeutic opportunities. Antioxid Redox Signal;15(7):1957-1997.
20. Pellegrino D. (2016). Antioxidants and cardiovascular risk factors. Diseases. 4(1):11.
21. Osganian SK, Stampfer MJ, Rimm E, Spiegelman D, Manson JE, Willett WC. (2003). Dietary carotenoids and risk of coronary artery disease in women. Am J Clin Nutr 77(6):1390-1399.
22. Pruthi S, Allison TG, Hensrud DD. (2001). Vitamin E supplementation in the prevention of coronary heart disease. In Mayo Clin Proc 76(11):1131-1136.
23. Calder PC. (2012). The role of marine omega-3 (n-3) fatty acids in inflammatory processes, atherosclerosis and plaque stability. Mol Nutr Food Res;56(7):1073-1080.
24. Kattoor AJ, Pothineni NV, Palagiri D, Mehta JL. (2017). Oxidative stress in atherosclerosis. Curr Atheroscler Rep 19(11):42.