Impact of supplementation of moringa olifera and emblica officinalis powder on atherosclerosis patients

B. Babitha[1,*], B.Vyshnavi[2]

[1]Assistant Professor, [2]PG Student, Dept. of Food and Nutritional Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India

***Corresponding Author:**
Email: babithabobba@yahoo.co.in

Abstract
Moringa oleifera and Emblica officinalis is used in Indian traditional medicine contains nitrile glycosides and thiocarbamate glycosides which are anti-hypertensive and anti hyperlipidemic activity. Impact of supplementation of Moringa oleifera and Emblica officinalis on anti hyperlipidemic activity of Atherosclerosis patients in Vijayawada hospitals. 60 subjects in the age group of 30-70 years were selected for present study. The drumstick leaves and amla powder was supplemented with meal 10gm for 50subjects per day respectively for a period of 40 days and remaining 10 subjects treated as control. The results showed that administration drumstick leaf and amla powder of 10gm for forty days produces significant ($P \leq 0.001$) reduction in anthropometric measurements and serum total cholesterol, triglyceride, LDL cholesterol and increase serum HDL cholesterol in experimental and no significant reduction in control group. Moringa olifera leaf and amla powder containing a variety of compounds and greater nutritional significance in the disease condition of atherosclerosis.

Keywords: Moringa oleifera, Anti hyperlipidemic, Atherosclerosis, Anthropometric.

Introduction
The incidence of atherosclerosis in coronary arteries is fast increasing worldwide. Coronary Artery Disease (CAD) affects the Indian population at a younger age than in other ethnic groups with more severe and extensive angiographic involvement. It is reported that although Kerala has the highest (82.8%) prevalence rate of coronary artery disease in patients above 60 years, states in North West India like Punjab have even higher prevalence in younger age group. Epidemiological studies performed in last 50 years have revealed that there is a significant rise in prevalence of coronary artery disease in urban as well as in rural Indian population and CAD has been predicted to assume epidemic proportions in India by the year 2015.

Atherosclerosis is a multi-factorial disease and about 250 different risk factors have been recognized. It is thought that atherosclerosis is caused by a response to damage to the endothelium from high cholesterol, high blood pressure, and cigarette smoking. There are the several main issues to be addressed in atherosclerosis viz. Hyperlipidaemia, clotting factors, oxidation of low-density lipoproteins (LDL) and inflammation. These factors collectively contribute to the development and rupture of atherosclerotic plaque (D'Souza T 2007). It can also be related to a hormonal disease such as diabetes mellitus, hypothyroidism and Cushing's syndrome; or to the use of certain medication such as birth control pills, hormone therapy, some diuretics (i.e. water pills) or beta-blockers to treat cardiovascular diseases. Experimental and clinical studies have shown that the amount of cholesterol transported in the Chylomicrons, VLDL, IDL and LDL classes of lipoproteins, known as pro-atherogenic cholesterol, is a risk factor for the occurrence of cardiovascular disease (Nidhi sharma et al. 2013).

Powder from drumstick leaves (Moringa oleifera) and amla (Emblica officinalis) were more effective in controlling lipid oxidation during storage. Moringa oleifera tree are reported to possess various pharmacological actions. The leaves and fruits are found to have hypocholesterolaemic activity in Wister rats and rabbits. The leaves can serve as a rich source of beta-carotene, vitamin C and E and polyphenols (Chumark et al. 2007). The leaves are cooked and used like spinach. In addition to being used fresh as a substitute for spinach, its leaves are commonly dried and crushed into a powder and used in soups and sauces (Pallavi joshi 2010). Moringa leaf a significant decrease in the levels total cholesterol, triglyceride, HDL, LDL and VLDL.

Goose berry is strengthens the heart muscle so the heart pumps blood smoothly throughout the body. By reducing excess cholesterol build-up, the chromium can reduce the chances of atherosclerosis, or plaque build-up in the vessels and arteries. This can reduce the chances of strokes and heart attacks. The iron content promotes the creation of new red blood cells, increasing circulation and the oxygenation of organs and cells to maximize growth and regeneration of tissue, while keeping the blood vessels and arteries clean (Kavita et al. 2016). Hence, the present study has been undertaken with the impact of Moringa oleifera leaf and Emblica officinalis powder supplementation on anthropometry and lipid profile of atherosclerosis patients.

Materials and Methods
Sixty atherosclerosis patients (38 men and 12 women) were selected from Vijayawada government

hospital, Andhra hospitals and Pinnamaneni Siddhartha Hospital in Vijayawada, Andhra Pradesh, India. Assessment of anthropometric status was done followed by estimation of serum lipid levels. Then supplement was given for 40 days. Then estimation of serum lipid levels and anthropometric parameters were done after supplementation. The weight in kilogram, height, mid upper arm circumference (MUAC) and waist-hip ratio (WHR) circumference in centimeters was measured by using the procedure described by Jellifee (1966) using the scales. Body mass index was calculated using height and weight data and patients were classified into different degrees of nutritional status using the cutoff levels suggested for Asian men and women (IOTF/WHO 2000).

The parameters of lipid profile which were observed Total Serum Cholesterol (TC) Triglycerides (TG) Low Density Lipoprotein Cholesterol (LDL), High Density Lipoprotein Cholesterol (HDL) and Atherogenic Index (AI). Serum LDL Cholesterol was estimated by using Friedewalds equation (Friedwald WT et al, 1972).

Drumstick leaves and amla fruit was procured from local market. Powder was prepared by using procedures followed by (Pallavi Joshi, 2010 and Mishra et al. 2009). Each patient was given 10gm of supplement consisting of 5gm of drumstick leaves and 5gm of amla powder with meal 50subjects per day respectively for a period of 40 days and remaining 10 subjects treated as control and keen follow up was done under medical supervision.

The changes on the anthropometric and lipid levels of each group before and after supplementation were observed and statistically analyzed using paired T-test. Data was expressed as mean ± standard deviation.

Results

Anthropometric Parameters: After 40 days period of amla and drumstick leaves powder supplementation the experimental group and control group mean before and after anthropometric values were presented in table 1. The mean height of experimental group initial value was 153.9, final value was 153.4cm and the mean height of control group initial value was 155.7, final value 155.7. There was no significant difference between mean values of height, before and after taking supplementation in experimental and control group. The mean weight of experimental group initial value was 59.9, final value was 58.3kg.There was a decrease in body weight in experimental group at the end of supplementation. the weight was statistically observed significant at 95 % (P< 0.005). The mean initial and final weight values of control group were 59.3 and 60.62 kg. There was statistically highly significant difference observed in control group at 99 % (P< 0.001).

The mean BMI of experimental group initial and final values were 23.40 and 22.52. In experimental group there was reduction in BMI and the subjects showed statistically highly significant (P<0.001). The mean BMI of control group initial value was 21.8 and final value was 21.8. There was no significance in BMI.

Table 1: The mean values anthropometric measurements of the experimental and control groups

Anthropometric parameters	Experimental group (n=50) (Mean ± SD)		't' value	Control group (n=10) (Mean ± SD)		't' value
	Initial	Final		Initial	Final	
HEIGHT (cm)	153.9±2.75	153.5±2.85	0.06NS	155.7±2.79	155.73±2.813	0.033NS
WEIGHT (kg)	59.9±2.34	58.3±2.22	1.40*	59.3 ± 2.11	60.62 ± 2.23	3.28**
MI (kg)	23.40±1.59	22.5±1.59	3.25**	21.8 ± 2.05	24.86 ± 0.91	0.0008**
WHR	0.89±0.02	0.82±0.04	3.28**	0.86 ± 0.05	0.91 ± 0.06	1.32*
MUAC (cm)	12.08±0.36	11.6±0.61	7.33**	12.2 ± 0.53	12.37 ± 0.49	8.04**

*Significant at 99% (P< 0.0001), ** Significant at 95% (P< 0.0005), NS Not significant

The mean WHR of experimental group initial value was 0.89, final value was 0.82. There was a decrease in waist hip ratio in experimental group and statistically significant at 99% (P<0.001). The mean initial and final waist hip ratio values of control group were 0.86 and 0.91 cm. There was increase in WHR values of control group and statistically significant at 95% (P<0.005).

The mean MUAC of experimental group initial value was 12.08, final value was 11.6 cm. There was decrease in mid upper circumference of experimental group at the end of supplementation and there was statistically highly significant at 99% (P< 0.001). The mean initial and final MUAC values of control group were 12.2 and 12.37cm. There was increase in MUAC in control group. This increase was statistically highly significant ant 99% (P< 0.001).

Biochemical Parameters

The drumstick leaves powder supplementation done by Nambiar et al. 2005 observed the drumstick leaves powder was decrease the high cholesterol and triglyceride values and increase the HDL levels. Khopde et al. 2001 supplemented with amla powder 0f 10gm for one month produces significant reduction of serum total cholesterol, triglyceride LDL cholesterol and increase the HDL cholesterol levels. Ramirez et al. 2013 concluded that consumption of amla and

drumstick leave powder may significantly reduce total cholesterol and increase HDL cholesterol in blood.

The mean HDL of experimental group initial value was 37.96 final value was 40.44 mg/dl (Table 2). There was increase in HDL in experimental group at the end of supplementation. This increase was statistically highly significant at 99 % (P< 0.001). The mean initial and final HDL values of control group were 37.7 and 36.5 mg/dl. There was increases less in HDL values in control group and statistically significant at 95 % (P< 0.005). The mean LDL of experimental group initial value was 174.7 final value was 171.08 mg/dl. There was a decrease in LDL in experimental group at the end of supplementation and statistically significant at 95 % (P< 0.005). The mean initial and final LDL values of control group were 169.4 and 170.05 mg/dl. There was increase in LDL in control group. This increase was statistically highly significant at 99 % (P< 0.001).

The mean VLDL of experimental group initial and final values were 40.8 and 36.72 mg/dl. There was statistically significant at 99 % (P< 0.001). The mean initial and final VLDL values of control group were 43.7 and 44.43 mg/dl. There was increase in VLDL in control group and statistically highly significant at 99 % (P< 0.001).

Table 2: The mean serum lipid levels before and after the supplementation.

Lipid profile (mg/dl)	Experimental group (n=50) Mean + SD			Control group (n=10) Mean + SD		
	Initial	Final	't' value	Initial	Final	't' value
HDL (mg/dl)	37.96 ± 2.94	40.44 ± 4.91	3.0**	37.7 ± 2.11	36.56 ± 2.26	0.001*
LDL (mg/dl)	174.7 ± 23.2	171.08 ± 23.13	1.16*	169.4 ± 15.5	170.55 ± 15.52	0.0001**
VLDL (mg/dl)	40.8 ± 6.29	36.7 ± 6.66	5.52**	43.7 ± 8.08	44.43 ± 4.76	4.768**
Total cholesterol (mg/dl)	261.2 ± 31.6	253.9 ± 34.8	1.97*	254.3 ± 14.2	257.4± 13.51	0.0004**
Triglyceride (mg/dl)	233 ± 31.6	216.4 ± 31.9	1.67*	214.6 ± 21.9	220.4 ± 21.73	0.001*

*Significant at 99% (P< 0.0001) ** Significant at 95% (P< 0.0005).

The mean total cholesterol of experimental group initial value was 261.2 final value was 253.9 mg/dl. There was a decrease in total cholesterol in experimental group at the end of supplementation. This decrease was statistically significant at 95 % (P< 0.005). The mean initial and final total cholesterol values of control group were 254.3 and 257.4 mg/dl. There was increase in total cholesterol in control group. This increase was statistically highly significant at 99 % (P< 0.001).

The mean triglyceride of experimental group initial value was 233.02 final value was 216.4 mg/dl. There was a decrease in triglyceride in experimental group at the end of supplementation. This decrease was statistically significant at 95 % (P< 0.005). The mean initial and final triglyceride values of control group were 214.6 and 220.4 mg/dl. There was increase in triglyceride in control group and statistically significant at 95 % (P< 0.005).

Discussion

Emblica officinalis and Moringa olifera leaf powder supplementation was beneficial effects on weight, height, BMI, WHR, MUAC and lipid profile, thereby, potentially decreasing the risk for atherosclerosis and other cardiovascular disease in subjects with metabolic syndrome. This may be due to the interactive or synergistic effect of the numerous constituents found in Emblica officinalis and Moringa olifera leaf powder. The present study results are in agreement with the results of Biswas Gopa et al. 2012 treatment with Amla produced significant reduction of TC (P<0.0001), LDL (P<0.0001) triglyceride (TG) and VLDL (P<0.0002) and a significant increase in HDL levels (P<0.0002). Similarly treatment with simvastatin produced significant reduction of TC (P<0.0001), LDL (P<0.0009), TG and VLDL (P<0.017) and a significant increase in HDL levels (P<0.0001). The experimental result of Chumark et al. 2007 moringa leaf powder supplementation at 12 weeks of treatment ther was a significantly (P < 0.05) lowered the cholesterol levels and reduced the atherosclerotic plaque formation to about 50 and 86% respectively.

Conclusion

Supplement was responsible for inhibit the anthropometric measurements and control the increase of lipid profile value, consumption of Emblica officinalis and Moringa olifera leaf powder containing a variety of compounds and greater nutritional significance in the disease condition of atherosclerosis.

References

1. D'Souza T., Mengi S.A., Hassarajani S., Chattopadhayay S. Efficacy study of the bioactive

fraction (F-3) of Acorus calamus in hyperlipidemia. *Indian J Pharmacol.* 2007;39:196-200.
2. Nidhi Sharma, Preeti Sharma, Nakuleshawar Dut Jasuja and Suresh Chand Joshi. Hypocholesterolemic and antioxidant potentials of some plants and herbs: A review. *Research & Reviews: J of Zoological Sciences.* 2013;1(2):26-42.
3. Chumark P, Khunawat P , Sanvarinda Y , Phornchirasilp S , Morales NP , Phivthong Ngam L , Ratanachamnong P, Srisawat S, Pongrapeeporn KU. The in vitro and ex vivo antioxidant properties, hypolipidaemic and antiatherosclerotic activities of water extract of Moringa oleifera Lam. leaves. *Journal of Ethnopharmacology*. 2007;116(3):439-46.
4. Pallavi Joshi and Dipika Mehta. Effect of dehydration on the nutritive value of drumstick Leaves. *J of Metabolomics and Systems Biology*. 2010;1(1):5-9.
5. M. B. Kavita, Mallika KJ, Poornima B. A clinical study on effect of amalaki (indian gooseberry) as food supplement in dyslipidemia. *Int J of Research in Ayurveda and Pharmacy*. 2016;7(4):59-64.
6. Jelliffee DB. Assessment of the Nutritional Status o f the Community, WHO Monograph Geneva: *WHO*. 1966;53.
7. IOTF/WHO. The Asia Pacific perspective: Redefining obesity and its treatment. Caulfield, Victoria. *Int Diabetic Institute.* 2000.
8. Friedwald W.T., Levy R.I., Frederickson D.S. Estimation of LDL Cholesterol in plasma without preparation of ultracentrifuge. *Clin Chem*. 1972;18:449-502.
9. Mishra, P., V. Srivastava, D. Verma, O.P. Chauhan and G.K. Rai. Physico-Chemical properties of Chakiya variety of Amla (Emblica officinalis) and effect of different dehydration methods on quality of powder. *Afr J Food Sci*. 2009;3:301-306.
10. Biswas Gopa, Jagatkumar Bhatt, and Kovur G. Hemavathi. A comparative clinical study of hypolipidemic efficacy of Amla (Emblica officinalis) with 3-hydroxy-3-methylglutaryl-coenzyme-A reductase inhibitor simvastatin. *Indian J Pharmacol*. 2012;44(2):238–242.