

Effect of supplementation of drumstick leaves powder on lipid profile of hyperlipidemics

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Hyperlipidemia is an established major risk factor for coronary heart disease. Increased dietary intake of natural photochemical correlates with reduced coronary heart diseases and life long expectancy. Drumstick leaves are good source of natural antioxidant due to the presence of various types of antioxidant compounds such as ascorbic acid, flavonoids, phenolics, glycosides, alkaloids and carotenoids (Anwar *et al.*, 2005 and Makkar and Becker, 1996) keeping in view the potential uses with medicinal, nutritional and socio-economic value the present study was planned with the main objective to explore effectiveness of drumstick leaves powder chutney supplementation prepared by utilizing Drumstick leaves powder (*Moringa olifera* L.), Bengal gram dal powder (*Cicer aritinum* L.), Black gram dal powder (*Vigna mungo* L.), Niger seed powder (*Guizotia abyssinica*), jaggery, Tamarind (*Tamarindus indica* L.) and Chilli powder (*Capsicum annum*) on lipid profile of subjects along with their regular routine diet, exercise and medicine. Selected subjects were divided in to two group as experimental and control. drumstick leaves powder chutney was supplemented to experimental group for 60 days. Values of lipid profile of both the control and experimental group were recorded at initial, 30 and 60 days. Value of experimental group and control group was compared. It was found that drumstick leaves powder chutney exerted positive effect in reducing total cholesterol, LDL cholesterol, triglyceride in case of experimental group.

Key Words : Drumstick leaves powder chutney, Lipid profile, Hyperlipidemics subjects

How to cite this article : Bidwe, Ashwini and Khan, Tasneem Naheed (2017). Effect of supplementation of drumstick leaves powder on lipid profile of hyperlipidemics. *Food Sci. Res. J.*, 8(2): 298-302, DOI : 10.15740/HAS/FSRJ/8.2/298-302.

INTRODUCTION

It is well documented that diets rich in polyunsaturated fatty acids lead to reduced plasma cholesterol levels and lower atherogenic risk (Nydahl *et al.*, 1994). High dietary cholesterol levels result in high serum cholesterol and consequently a higher risk of arteriosclerosis and coronary heart disease (Grundy,

1990). There has been a sharp rise in the prevalence of chronic degenerative disease (CDD'S) due to an increase in the life expectancy rate, rapid urbanization but predominantly being due to changes in the dietary pattern, consumption of variety of fast foods, rich in fat and free sugars resulting in nutritional excesses. The affluent diet has increased the prevalence of non communicable diseases in the developed countries. Consumption of such foods on regular basis leads to the development of overweight and obesity and a strong link between obesity and cardiovascular diseases have been reported (Nambiar and Guin, 2007).

Green leafy vegetables and fruits are a rich source of micronutrients and other phytochemicals having antioxidant properties. Though India stands second in

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vegetables and fruits production, hardly two per cent of the produce is processed and 30 - 40 % is being wasted due to lack of processing and preservation infrastructure (Adeyeye, 2002). There are many varieties of green leafy vegetables, which are rich and natural source of iron and other essential micronutrients, but they are discarded and are not used for human consumption. Drumstick leaves (*Moringa oleifera*) is one of them, which is available at no cost and is very rich in all the micronutrients. It is an exceptionally nutritious vegetable tree with a variety of potential uses with medicinal, nutritional and socioeconomic value. The tree is often referred as a “wonder-tree” for its multipurpose usability and also known as “Drumstick-tree”, “Horseradish-tree” and “Ben-oil tree”. Affectionate names to Moringa people gave as “Miracle Tree,”.

Moringa roots, leaves, flowers, gum and the aqueous infusion of seeds have been found to possess diuretic activity (Caceres *et al.*, 1992 and Morton, 1991) and such diuretic components are likely to play a complementary role in lowering blood pressure. A diet rich in plants such as *Moringa* can significantly improve human health by reducing cholesterol levels and triglycerides, controlling blood sugar, offering vitamins and minerals for maintaining normal physiology, powerful anti aging and anti-inflammatory natural substances. The crude extract of *Moringa* leaves has a significant cholesterol lowering action in the serum of high fat diet fed rats which might be attributed to the presence of a bioactive phytoconstituent, *i.e.* β -sitosterol (Ghasi *et al.*, 2000). Keeping focus on above point's present investigation was carried out to ascertain the effect of supplementation of drumstick leaves powder on lipid profile of hyperlipidemics.

METHODOLOGY

Drumstick leaves powder chutney was prepared utilizing Drumstick leaves powder, Bengal gram dal powder, Black gram dal powder, Niger seed powder, jaggery, Tamarind and Chilli powder.

A total number of twenty subject were selected following the purposive sampling technique and they were personally interviewed with the help of pretested questionnaire to elicit information regarding socio – economic background, health status. Among the selected subjects ten were treated as experimental group and remaining ten were as control group. The drumstick leaves

powder chutney was supplemented to experimental group (10 subject) for 60 days. Where as remaining ten subject (control group) did not receive supplementation. The periodic observations of lipid profile of both the control and experimental group were recorded at initial, 30 and 60 days. Blood sample analyzed by CHOD-PAP method for estimation of lipid profile. The were statistically analyzed by applying t test (Panse and Sukhatme, 1985).

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Lipid profile of experimental group before and after supplementation :

The mean values of lipid profile in the serum of the experimental group before (0 days) and after (30 and 60 days) supplementation are presented in Table 1.

The initial mean values for the total cholesterol, triglycerides, LDL Cholesterol and HDL cholesterol prior to the supplementation of drumstick leaves powder chutney were 214.4 ± 13.96 , 233.6 ± 24.20 , 125.6 ± 14.96 and 41.5 ± 1.02 mg/dl of serum, respectively. The values obtained after the supplementation of drumstick leaves powder chutney at the end of 30 days of the study period for the corresponding parameters were 193.2 ± 10.10 , 169.0 ± 16.01 , 115.6 ± 9.98 and 43.2 ± 1.23 mg/dl of serum, respectively.

Results indicated that there was slight reduction in the contents of total cholesterol, triglycerides and LDL cholesterol in the serum after the supplementation of drumstick leaves powder chutney for a period of 30 days but statistically it was non significant ($P > 0.05$).

On the other hand there was an increase in the levels of HDL cholesterol after the supplementation of drumstick leaves powder chutney. Initially the value was found to be 41.5 ± 1.02 mg/dl of serum and at the end of 30 days it was 43.2 ± 1.23 mg/dl. The difference between the two values was noticed to be statistically non-significant.

The mean value of total cholesterol, triglycerides and LDL cholesterol was 171.4 ± 7.55 , 142.2 ± 9.98 and 95.7 ± 7.88 mg/dl of serum were recorded at the end of 60 days. It is evident from the results that there was a marked reduction in the total cholesterol, triglycerides and LDL cholesterol when the values were compared with values obtained at 30 days of supplementation. The difference

noticed was found to be statistically non significant.

In case of HDL cholesterol at 30 days increase was found from 43.2 ± 1.23 to 46.8 ± 1.13 mg/dl at the end of 60 days. The difference between two values of HDL cholesterol, however was found to be statistically non significant.

Besides the final values of 60 days study period when compared with their initial values, the values of total cholesterol, triglycerides, and HDL cholesterol were noticed to differ significantly where as the LDL cholesterol level showed statistically non-significant difference.

In a nutshell the results of serum lipid profile of experimental group revealed that supplementation of drumstick leaves powder chutney for 60 days reduced significantly total cholesterol and triglycerides over initial value and more importantly enhancement of the beneficial

HDL cholesterol was observed which is considered to be good cholesterol. Similar effect has been reported by Yang *et al.* (2006), Ara *et al.* (2008) and Jain *et al.* (2010).

Plant foods contain a large number of phytonutrients that have the potential for offering protection against a range of non communicable diseases like diabetes, cancer, cardiovascular disease and cataract. Hence the intake of drumstick leaves powder chutney can be recommended for consumption among the hyperlipidemic and hypertensive subject.

Lipid profile of experimental and control group before and after supplementation :

The changes in the mean values of lipid profile of experimental and control group before and after supplementation of drumstick leaves powder chutney are

Table 1 : Lipid profile of experimental group before and after supplementation (n=10)

Lipid profile	(Before supplementation)		(After supplementation)			
	Initial		30 days		60 days	
	Range	Mean \pm SE	Range	Mean \pm SE	Range	Mean \pm SE
Total Cholesterol (mg/dl)	167-275	214.4 \pm 13.96	148-265	193.2 \pm 10.10	138-220	171.4 \pm 7.55
Triglycerides (mg/dl)	166-423	233.6 \pm 24.20	122-286	169.0 \pm 16.01	82-207	142.2 \pm 9.98
LDL- Cholesterol (mg/dl)	75-200	125.6 \pm 14.96	75-181	115.6 \pm 9.98	62-142	95.7 \pm 7.88
HDL- Cholesterol(mg/dl)	37-46	41.5 \pm 1.02	36-48	43.2 \pm 1.23	42-54	46.8 \pm 1.13
't' values of lipid profile (students paired 't' test)						
Days	Total cholesterol		Triglycerides		LDL- Cholesterol	
Zero Vs 30	1.23 NS		2.22 NS		0.56 NS	
30 Vs 60	1.72 NS		1.42 NS		1.60 NS	
Zero Vs 60	2.70 *		3.49 **		1.76 NS	

* and ** indicate significance of values at P=0.05 and 0.01, respectively

NS=Non-significant

Table 2 : Lipid profile of experimental and control group before and after supplementation (n=20)

Lipid profile	Mean \pm SE		Difference	't' value	
	Initial (0 days)	Final (60 days)		I vs F (0 Vs 60 days)	E Vs C (60 days)
Total Cholesterol (mg/dl)					
Experimental	214.4 \pm 13.96	171.4 \pm 7.55	43.00 \pm 6.41	2.70*	3.96**
Control	197.6 \pm 10.82	215.3 \pm 8.09	17.7 \pm 2.73	1.30 NS	
Triglycerides (mg/dl)					
Experimental	233.6 \pm 24.20	142.2 \pm 9.98	91.4 \pm 14.22	3.49**	3.18*
Control	242 \pm 40.91	241.7 \pm 29.64	0.3 \pm 11.27	0.00 NS	
LDL- Cholesterol (mg/dl)					
Experimental	125.6 \pm 14.96	95.7 \pm 7.88	29.9 \pm 7.08	1.76 NS	1.03 NS
Control	97.4 \pm 11.07	109.8 \pm 11.16	12.4 \pm 0.09	0.78 NS	
HDL- Cholesterol (mg/dl)					
Experimental	41.5 \pm 1.02	46.8 \pm 1.13	5.3 \pm 0.11	3.47**	1.01 NS
Control	37.5 \pm 1.31	56.1 \pm 9.05	18.6 \pm 7.74	2.03 NS	

I-Initial F-Final E-Experimental C-Control
* and ** indicate significance of values at p=0.05 and 0.01, respectively

NS= Non-significant

presented in Table 2.

The mean decrease in the total cholesterol of experimental as well as control groups were 43.00 ± 6.41 and 17.7 ± 2.73 mg/dl, respectively. The decrease in total cholesterol in case of experimental group was found to be significant at 0.05 per cent level and in case of control group it was non-significant. Besides the comparison of the mean decrease in the cholesterol between the experimental and control groups showed statistical significance at 0.01 per cent level.

It was found that the supplementation of drumstick leaves powder chutney for 60 days exhibited the noticeable decrease in the triglyceride value over the initial value. Decreasing trend was statistically significant at 0.01 level of probability. In control group this trend was reverse but statistically non-significant.

In case of LDL cholesterol it was observed that supplementation of drumstick leaves powder chutney for the experimental group for 60 days declined the cholesterol to the tune of 29.9 ± 7.08 mg/dl and for control group mean decrease was found to be 12.4 ± 0.09 mg/dl over initial value. However, in both the groups the difference was statistically non-significant.

The mean values of LDL cholesterol of experimental group obtained at 60 days of experimental period showed the statistically non-significant difference when it was compared with control group (E Vs C).

In case of supplementation of drumstick leaves powder chutney to the experimental group, the level of HDL cholesterol was increased by 5.3 ± 0.11 mg/dl. The difference in the initial and final values was found significant at 0.01 level of probability.

On the other hand in control group exhibited the decrease in the HDL cholesterol by 18.6 ± 7.74 mg/dl but it did not show significant difference. The results of the study revealed that the comparison in the mean increment in HDL cholesterol between the experimental and control group showed statistically non-significant.

From the findings it is concluded that supplementation of drumstick leaves powder chutney for 60-days in the experimental group had better impact of reducing the total cholesterol and triglycerides. On statistical analysis the significant results were noticed.

On the other hand the experimental group consuming drumstick leaves powder chutney for 60 days showed significant increase in HDL cholesterol. Similar effect has been reported by Nambiar *et al.* (2010).

β -sitosterol is one of the plant sterol which lowers the cholesterol level by lowering plasma concentration of LDL and by inhibiting the reabsorption of cholesterol from endogenous sources in association with a simultaneous increase in its excretion into faeces in the form of neutral steroids. Therefore it can be concluded that β -sitosterol may be a bioactive phytoconstituent in the leaves of *Moringa oleifera* which may be responsible for its lipid lowering effect.

The marked reduction in total cholesterol and triglycerides of the subjects after the supplementation may be due to antioxidants, phytochemicals and pharmacological factors present in drumstick leaves powder.

In conclusion this study confirms that supplementation of drumstick leaves powder have a modulating role in the treatment of hypertension, hyperlipidemia and confirm a part of therapy in its management.

Conclusion :

In a nutshell the results of serum lipid profile of experimental group revealed that supplementation of drumstick leaves powder chutney for 60 days reduced significantly total cholesterol and triglycerides over initial value and more importantly enhancement of the beneficial HDL cholesterol was observed which is considered to be good cholesterol.

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Received : 23.06.2017; Revised: 19.08.2017; Accepted : 03.09.2017