Original Article

Effect of turmeric (Curcuma longa) on overweight hyperlipidemic subjects: Double blind study

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Abstract

Objective: To evaluate the effect of turmeric (*Curcuma longa*) on serum lipid profile in overweight hyperlipidemic subjects.

Methods: This was a double blind randomised control study. The study was conducted in the Department of Medicine, CSM Medical University, Lucknow from July 2010-June 2011. A total of 120 subjects were interviewed using a pre-tested semi-structured schedule whose BMI>25 and total cholesterol>200 mg/dl and/or triglyceride>150 mg/dl, were divided randomly using random number table into 2 groups Group-I (Aquous extract of Turmeric-1.4 gm per day) (n=53) and Group-II (Placebo) (n=52) for three months. They were given the same color capsules without revealing their identity, with the instructions to take the contents of each pack twice a day before meal for 90 days. Subjects were asked to give their 12 hour fasting blood samples on 0, 30, 60 and 90 day. The paired t-test was used to compare the changes amongst follow-ups and unpaired t-test was used to compare between groups. p-value<0.05 was considered as significant.

Results: At the baseline, both the groups were similar in anthropometric and clinical parameters. Treatment group produced significant (p<0.0001) reduction in lipid profiles such as serum total cholesterol, triglyceride and LDL-cholesterol and VLDL- cholesterol in hypercholesteremic group from 0 day to 30, 60 and 90 day of follow-ups. However, there was no significant change in the placebo group. The percentage reduction was higher in the subjects of Turmeric group as compared to Placebo.

Conclusion: Aquous extract of Turmeric has shown lipid lowering properties among overweight hyperlipidemic subjects.

Key words: Double blind, Turmeric, Hyperlipidemic effect

Introdruction:

Curcuma longa, Valeton (Zingiberaceae) or turmeric (locally known as haldi) has been widely used in India and other parts of Southeast Asia as a spice and a coloring agent in cooking. It is rich in vitamins, carbohydrates, proteins and also contains an array of oils. In traditional medicine, the rhizomes are used to treat gum inflammation, rheumatism and diarrhea. Curcumin is the major constituent of turmeric curcuminoids and has been found to have antioxidant, antitumor, anti-inflammatory properties[1,2,3]. Besides these well-known effects, curcumin was also found to affect lipid metabolism. More than 30 years ago, Rao et al showed that administration of curcumin decreased cholesterol levels in the blood and liver in normal animals[4]. Similar reductions were also identified thereafter in diabetic animals and animals fed high fat[5,6,7] and in healthy humans, varied with the dose, age and the period of administration[8,9,10]. The mechanism underlying the hypocholesterolemic effect may be related to the up-regulation of LDL receptor[11,12].

Thus, the present double blind study was planned to study the hypolipidemic effect of turmeric on the reduction of lipid profiles among north Indian overweight subjects.

Methods:

Study design: This was a double blind randomised control study.

Study site: Department of Medicine, CSM Medical University, Lucknow.

Study subjects: The subjects were taken from the OPD of the Department of Medicine, CSM Medical University, Lucknow. Subjects between 15-45 years with BMI>25, total cholesterol>200 mg/dl &/or triglaceride>150 mg/dl, without any occult symptoms of cardiovascular diseases, HIV, cancer, chronic liver or kidney diseases and who were not given any hypolidemic drug earlier, were included in the study. Subjects were divided into two groups: Group-I received 1.4 gm per day aquous extract of Turmeric, encapsulated, in two divided dose and Group-II received same amount of placebo.

Intervention method: After clinical examinations, their basal lipid profile was obtained and they were divided randomly using random number table into 2 groups Group-I (Turmeric) (n=53) and Group-II (Placebo) (n=52). They were given the same color capsules without revealing their identity, with

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the instructions to take the contents of each pack twice a day before meal for 90 days.

Biochemical estimations: Lipid profile was estimated from the 12 fasting blood samples collected on days 0, 30, 60 and 90 in the Biochemistry Department, CSM Medical University, Lucknow.

Statistical analysis: The changes in lipid profiles were analysed by using unpaired t-test between groups and paired t-test amongst the follow-ups. The p-value<0.05 was considered as significant. All the analysis was carried out by using SPSS 15.0 version.

Ethical consideration: The study was approved by the Ethical Committee of CSM Medical University. The consent from each subjects were taken before the enrolment in the study.

Results:

There were 53 subjects Group-I (Turmeric) and 52 subjects in Group-II (Placebo). The baseline biosocial characteristics of the subjects are depicted in the Table-1. There were no significant differences in the biosocial characteristics and lipid profiles at 0 day of the subjects between both the groups, thus, both groups were comparable.

Effect on total cholesterol:

The total cholesterol was significantly reduced in Turmeric treated subjects from 0 day (231.95±52.2) to 30 day (198.09±35.97) ($p<0.0001$), 60 day (178.94±33.51) ($p=0.001$) and 90 day (158.45±32.87) ($p<0.0001$) of follow-ups. However, no significant reduction was found in the subjects of Placebo treated over the follow-ups ($p>0.05$). There was higher significant ($p<0.05$) difference in the cholesterol levels in the subjects of Turmeric group as compared to Placebo group at 30, 60 and 90 day.

Effect on triglycerides:

The triglycerides level was significantly reduced in Turmeric treated subjects from 0 day (217.16±113.83) to 30 day (172.02±69.75) ($p<0.0001$), 60 day (149.29±51.82) and 90 day (131.75±37.49) ($p<0.0001$) of follow-ups. However, no significant reduction was found in the subjects of Placebo treated over the follow-ups ($p>0.05$). There was significant difference ($p<0.05$) in the triglycerides level in the subjects of Turmeric group as compared to Placebo group at 60 and 90 day.

Effect on LDL:

The LDL level was significantly reduced in Turmeric treated subjects from 0 day (140.03±50.42) to 30 day (113.70±33.70) ($p<0.0001$) and 90 day (81.92±30.11) ($p<0.0001$) of follow-ups. However, no significant reduction was found in the subjects of Placebo treated over the follow-ups ($p>0.05$). There was significant ($p<0.05$) difference in the LDL levels between Turmeric and Placebo groups at 30, 60 and 90 day.

Effect on VLDL:

The VLDL level significantly reduced in Turmeric treated subjects from 0 day (43.43±22.77) to 30 day (34.40±13.95) ($p<0.0001$), 60 day (29.86±10.36) and 90 day (26.35±7.50) ($p<0.0001$) of follow-ups. However, no significant reduction was found in the subjects of Placebo treated over the follow-ups ($p>0.05$). There was significant difference ($p<0.05$) in the VLDL levels in the subjects of Turmeric group as compared to Placebo group at 60 and 90 day .

Effect on HDL:

The HDL level was almost similar among both Turmeric and Placebo groups ($p>0.05$) from 0 day to follow-ups ($p>0.05$) and no significant ($p>0.05$) difference was observed between Turmeric and Placebo subjects at 30, 60 and 90 day.

The percentage change was higher in Turmeric group as compared to Placebo (Fig.1).

Table-1: Bio-social characteristics of the subjects

Demographic indicators	Turmeric (n=53)		Placebo (n=52)	
	No.	%	No.	%
Age				
21-30	11	22.9	4	10.3
31-40	9	18.8	5	12.8
41-50	15	31.3	13	33.3
51-60	13	27.1	17	43.6
Sex				
Male	20	41.7	19	48.7
Female	28	58.3	20	51.3
Religion				
Hindu	20	41.7	14	35.9
Muslim	27	56.3	25	64.1
Christian	0	0.0	0	0.0
Sikh	1	2.1	0	0.0
Caste				
General	41	85.4	33	84.6
OBC	3	6.3	4	10.3
SC	4	8.3	2	5.1
Marital Status				
Married	37	77.1	34	87.2
Widowed	4	8.3	5	12.8
Separated	2	4.2	0	0.0
Unmarried	5	10.4	0	0.0
Family size	6.2		5.6	
Socio-Economic status*				
I	1	2.1	1	2.6
II	3	6.3	7	17.9
III	21	43.8	14	35.9
IV	22	45.8	14	35.9
V	1	2.1	3	7.7

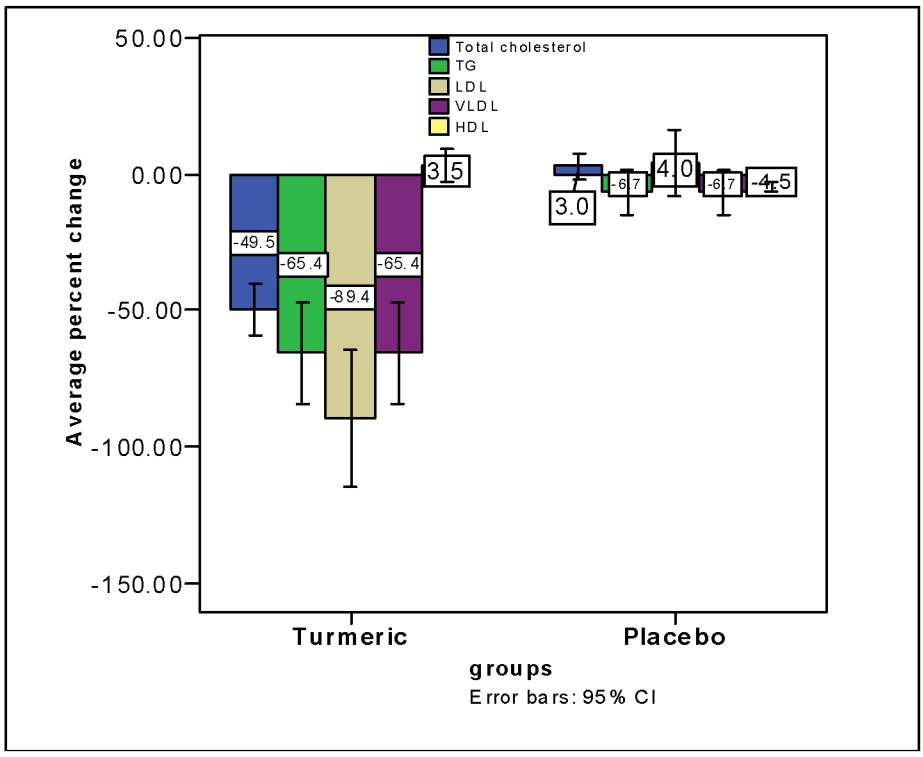
Group-I - 1.4 gm aquous extract of Turmeric,
Group-II- Same amount of placebo,
*Modified Kuppuswamy scale

Table-2: Changes in Lipid profile from 0 day to 90 day

Study Group	Lipid profile level (%mg) (mean±sd)			
	0 day	30 day	60 day	90 day
Total Cholesterol				
Turmeric	231.95±52.2	198.09±35.97*,[1]	178.94±33.51*,[1]	158.45±32.87*
Placebo	209.1±52.04	213.43±49.42	219.46±53.69	219.78±60.58
Triglyceride				
Turmeric	217.16±113.83	172.02±69.75*,[1]	149.29±51.82*,[1]	131.75±37.49*,[1]
Placebo	184.56±60.02	176.86±62.62	178.09±73.09	180.96±71.19
LDL				
Turmeric	140.03±50.42	113.70±33.70*,[1]	116.32±30.60*,[1]	81.92±30.11*,[1]
Placebo	120.44±55.78	127.73±52.75	135.57±58.83	133.92±61.44
VLDL				
Turmeric	43.43±22.77	34.40±13.95*	29.86±10.36*,[1]	26.35±7.50*,[1]
Placebo	36.91±12.00	35.37±12.52	35.62±14.62	36.19±14.24
HDL				
Turmeric	48.48±16.17	49.99±12.20	50.46±10.88	50.17±11.63
Placebo	51.83±10.09	50.33±10.45	48.27±12.70	49.69±9.65

Group-I -1.4 gm aquous extract of Turmeric, Group-II- Same amount of placebo,
*Significant ($p<0.0001$) from 0 day, [1]Significant between Group-I and II at follow-ups ($p<0.05$)

Fig.1: Mean percent change in lipid profiles from 0 day to 90 day



Discussion:

The present study investigated the effect of turmeric on north Indian overweight subjects. In the present study, the lipid profile was significantly decreased after the administration of aquous extract of turmeric among overweight subjects. Previous studies in animals and humans have shown that administration of curcumin decreased the cholesterol levels in blood[5,6,7]. The mechanism underlying the effects was considered to be related to the increased expression of LDL receptor[11,12]. Since intestinal absorption of cholesterol also affects the levels of cholesterol in the blood, whether uptake of cholesterol in the enterocytes can be affected by curcumin is therefore an important question to be studied.

The findings of the present study was similar to other studies which suggested that curcumin lowered serum cholesterol levels[4,13,14]. Soudamini et al.[15] investigated the effect of oral administration of curcumin on serum cholesterol levels and on lipid peroxidation in the liver, lung, kidney, and brain of mice treated with carbon tetrachloride, paraquat, and cyclophosphamide. Oral administration of curcumin significantly lowered the increased peroxidation of lipids in these tissues produced by these chemicals. Administration of curcumin also significantly lowered the serum and tissue cholesterol levels in these animals, indicating that the use of curcumin helps in conditions associated with peroxide-induced injury such as liver damage and arterial diseases. Soni and Kuttan examined the effect of curcumin administration in reducing the serum levels of cholesterol and lipid peroxides in 10 healthy human volunteers receiving 500 mg of curcumin per day for 7 days[10]. A significant decrease in the level of serum lipid peroxides (33%), an increase in high-density lipoproteins (HDL) cholesterol (29%), and a decrease in total serum cholesterol (12%) were noted. Because curcumin reduced serum lipid peroxides and serum cholesterol, the study of curcumin as a chemopreventive substance against arterial diseases was suggested in a review[16]. In the present study, the level of HDL was remained unchanged across the follow-ups.

Conclusion:

Aquous extract of Turmeric has shown lipid lowering properties among overweight hyperlipidemic subjects.

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