

Effect of *Murraya Koenigii* (Curry Leaves) Powder on the Liver and Renal Functions in Women with Hyperlipidemia

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ABSTRACT

Background: Hyperlipidemia is highly prevalent in rural India which progresses with age. Our previous randomized clinical trials showed hypolipidemic effect of curry leaves powder. Therefore this study was aimed to evaluate the effect of curry leaves on liver and renal functions in human subjects.

Methods: Forty menopausal healthy women of rural communities (45–65 years of age) with hyperlipidemia were treated with curry leaves powder (5 g), once daily for 45 consecutive days. The demographic variables were collected using questionnaire. Fasting blood samples were collected before and after the intervention. The liver function (serum transaminases) and renal function (urea and creatinine) tests were determined before and after the treatment.

Results: A statistically significant decrease was observed in transaminases after the consumption of curry leaves. Urea and creatinine in pre and post test was also highly significant ($P < 0.001$, paired t test). The mean score of the urea and creatinine in the post test was decreased.

Conclusions: Curry leaves have no harmful effect in both liver and kidney.

Keywords: Hyperlipidemia, curry leaves, cardiovascular diseases, liver function test, renal function test.

INTRODUCTION

High levels of cholesterol in the blood can increase the risk of cardiovascular diseases. Over the last two decades there has been an increasing emphasis placed on screening for high cholesterol and adopting interventions to reduce cholesterol levels in order to reduce the risk of heart disease. The high costs and side effects of hyperlipidemic drugs have made many people to turn for alternate treatments. Green leafy vegetables are less expensive and easily available

source of micronutrients. India have variety of climates and seasons and has number of nutritionally and medicinally important plant species such as spinach, coriander, amaranth, and curry leaves which are relatively inexpensive and readily available throughout the year. A number of herbal plants contain compounds called plant sterols. These plant sterols may help to fight high cholesterol as well as for the prevention and management of heart diseases. ^[1]

Murraya koenigii, commonly known as curry leaf or curry patta in Indian dialects, which represent more than 150 genera and 1600 species. Curry leaves belongs to the family Rutaceae. *M. koenigii* is a highly valued plant for its aroma and medicinal value. *M. koenigii* contains a number of chemical constituents that interact to elicit their Pharmacodynamic response. It has also have anti-oxidative, and cholesterol reducing activities. [2] It grows throughout the Indian subcontinent and has wide culinary effect and is one of the main components of formulations in the traditional Ayurvedic system. [3] In the present study the dried curry leaves powder was experimented to 40 subjects in the experimental group and the safety of the curry leaves consumption was examined by testing transaminases (SGOT, SGPT), urea and creatinine.

MATERIALS AND METHODS

Sample: The subjects of the study were selected from 4 communities after obtaining permission from District medical officer and authorities of Panchayath. Total 40 samples were selected randomly and assigned to experimental group (curry leaves).

Inclusion criteria: The study included Menopausal women who were between the age of 45-65years, those who were diagnosed with hyperlipidemia and having abnormal TC (>200mg/dl) and also abnormalities in one of the lipid parameters (HDL<40mg/dl, LDL>100mg/dl, Triglycerides>150 mg/dl) and subjects were not having co morbidity like auto immune diseases, liver and renal impairment, underwent surgical intervention in Gastro Intestinal Diseases and Irritable Bowel Syndrome.

Exclusion criteria: women who were having hyperlipidemia but suffering from other problems like auto immune diseases, liver and renal impairment, underwent surgical intervention in Gastro Intestinal Diseases and Irritable Bowel Syndrome and, those who were not willing to participate in the study

Methodology

Experiment group was instructed to come to the selected school in the community between 7.30 and 8.30 am with overnight fasting on the next day. The researcher collected the blood sample for lipid profile and LFT and RFT only for curry leaves intervention group and all the blood samples were given unique coding in order to blind the analyst about the subject group and sent to the laboratory.

Curry leaves preparation

Curry leaves were collected from the natural habitat. Cleaned the curry leaves with adequate care and dried under room temperature. It was further dried using micro oven for 3 minutes and finely powdered. The powder was prepared under hygienic condition. 100gram of fresh curry leaves gave around 35 gram of powder. 35 gm of each was packed in a food grade plastic bottle and distributed to the study subject after explanation. The subject was instructed to consume 5gm of curry leave powder adding to the main side dish during the lunch for 45 days.

The 5gm of powder provided 0.5 gm of carbohydrate, 0.4gm of fiber, 0.34 mg μ g of s-carotene, 31.4 mg of total chlorophyll and 5.86 mg of vitamin C. A portion of the test substance was sent to the NABH laboratory prior to the data collection for analyzing the organophosphorus pesticides residues (Ref. NO.HO/LRO:198662/15) and result showed substances were free of organophosphorus pesticides residues. The powder was freshly prepared once in 7days and given to the experimental study subjects. Control group did not receive any supplementation. Both the groups were instructed to maintain the regular life style and exercise. Subjects were given a diary after explanation to document the intervention daily.

A telephone call was performed every day to remind and visited every week to comply with consumption as well as to enquire any adverse event from the consumption. The powder was freshly prepared once in 7days and given to the

experimental study subjects. After 45 days, post test was carried out with same procedure. LFT and RFT were done before and after for all subjects who consumed curry leaves powder. All pre and post intervention serum samples were analyzed in fully automated clinical chemistry analyzer in a diagnostic lab which had adequate quality assurance programme.

Statistical analysis

The analysis was carried out by using SPSS 23 version. The data were expressed as mean and standard error of mean. Wilcoxon Signed Ranks test was used to find the significant difference between pre and post mean. A probability of 0.05 or less was taken as statistically significant.

RESULTS

The pre test and post test of LFT; SGOT and SGPT done for the experiment of curry leaves group was highly significant ($p < 0.0001$, paired t test) (table 1). The mean score of the post test was less in post test was less in SGOT and SGPT. The renal function of the curry leaves experiment

group was observed with pre and post test was highly significant ($P < 0.0001$, paired t test) (Table 2). The post test means score of the urea and creatinine was decreased.

In the present study plant product, curry leaves powder was experimented to one group of the subjects were assessed the safety of curry leaves by examining the LFT and RFT. The subjects were initially assessed for LFT and RFT and administered curry leaves powder 5gm for 45 days. The mean post test of the SGOT was highly significant ($P < 0.0001$) both in parametric and non parametric test and SGPT also was significant ($P < 0.05$). However a statistically significant decrease was observed in liver function after consumption of curry leaves. Which revealed that curry leaves were not produced any toxicity it was protected the liver. Another study showed curry leaves have hepato- protective activity against ethanol induced hepatotoxicity. Chronic ethanol consumption diminishes the cellular antioxidant levels through free radical induced injury causing hepatitis and cirrhosis with mortality. [4]

Table 1: Assess the safety of the curry leaves on Liver Function Test

Variables	parameters Liver Function Test	Mean ± SE	t -test	P value Parametric test	P value Non parametric test
Curry leaves (5g)	SGOT				
	Pre test	26.85 ± 1.17	t=4.022	0.0001	0.0001
Post test	23.23 ± .78				
Curry leaves (5g)	SGPT				
	Pre test	19.63 ± 0.95	t=1.65	0.10	0.091
Post test	18.80 ± 0.88				

Values are mean ± SE, Wilcoxon Signed Ranks Test (n =40)

Table 2: Assess the effect of curry leaves on renal parameters.

Group	Renal Function Test parameters	Mean ± SE	t -test	P value Parametric test	P value Non parametric test
Curry leaves (5g)	Urea				
	Pre test	22.93 ± .76	t=3.898	0.0001	0.0001
Post test	20.75 ± .67				
Curry leaves (5g)	Creatinine				
	Pre test	0.75 ± 01	t=2.105	0.04	0.04
Post test	0.70 ± .01				

Values are mean ± SE, Wilcoxon Signed Ranks Test (n =40)

DISCUSSION

Plants have been the main source of medicines since ancient times. All human societies have utilized plant as source of therapy against ailments because of its phytochemicals which play an important role in boosting up various organ functions

by acting as antioxidants. Another study demonstrated that hydroethanolic leaf extracts of *M. koenigii* (200, 400 and 600 mg/kg body weight) significantly reduced the levels of alanine aminotransferases, aspartate aminotransferases, alkaline phosphatase, total bilirubin in CCl₄-treated

hepatotoxic rats. Additionally, *M. koenigii* treated rats also resulted in a dose-dependent increase in hepatic superoxide dismutase, catalase, reduced glutathione and ascorbic acid and a decrease in lipid peroxidation. Even the microscopic studies also revealed the minimal CCl₄-induced lesions in *M. koenigii* treated rats, thus suggesting the hepatoprotective potential of *M. koenigii*.^[5]

The post test mean score was reduced in urea and creatinine. The findings showed that curry leaves have no harmful effect in both liver and kidney. Curry leaves treat diabetes by influencing carbohydrate metabolism. Another study found the diabetic rats were fed curry leaves for 30 consecutive days and displayed sign of improved liver and kidney function. Curry leaves specifically restored liver and kidney enzyme responsible for breaking down carbohydrate back to normal and also reduced the cholesterol.^[6]

Curry leaf helps to improve the protein contents in the renal tubules of kidney in comparison to rats subjected to alloxan only. As an effective antioxidant, curry leaves can protect thiol group of proteins to prevent oxidation. When rats are treated with curry leaf extracts, it causes an increase amount of ribosomes in rough endoplasmic reticulum in the cells which reflect their ability to synthesize proteins.^[7] In vivo study suggested that antioxidant component of curry leaf have the potential to decrease protein damages in tissues because curry leaf have high protein contains that are effective to improve pancreatic and kidney cell dysfunction produced by alloxan.^[7] Curry Leaves are packed with antioxidants, which prevent the oxidation of cholesterol that forms LDL cholesterol. This in turn helps in increasing the amount of good cholesterol (HDL) and protect from heat diseases and atherosclerosis. Previous study by Kesri et al^[8] examined the effect of oral administration of curry leaves extracts in normal and STZ induced diabetic rats. Curry leaves at 300mg/kg body weight once

daily for one month could decrease the SGOT and SGPT by 21.7 and 25.0 % respectively. Another study found the diabetic rats were fed curry leaves for 30 consecutive days and displayed sign of improved liver and kidney function.^[6]

Phytochemistry of the curry leaves (*Murraya koenigii*) contains proteins, carbohydrate, fiber, minerals, carotene, nicotinic acid, Vitamin C, Vitamin A, calcium and oxalic acid. It also contains crystalline glycosides, carbazole alkaloids, koenigin, girinimbin, iso-mahanimbin, koenine, koenidine and koenimbine. Triterpenoid alkaloids cyclomahanimbine, tetrahydromahanimbine are also present in the leaves. Murrayastine, murrayaline, pyrayafoline carbazole alkaloids and many other chemicals have been isolated from *Murraya koenigii* leaves.^[9] Some of the primary alkaloids found in the Curry leaves, stems, and seeds Are As follows: Mahanimbine, girinimbine, koenimbine, mahanine, mahanine, Indicolactone, 2-methoxy 3 -methyl -carbazole. Health benefits of curry leaves: Eating curry leaves keeps liver healthy, they are beneficial in liver conditions such as cirrhosis, they also protects the liver from various infections. Curry leaves are excellent source of iron and its consumption can help people who suffer from anaemia. Curry leaves also good in digestion, along with their aromatic flavor are the reasons for popularity of curry leaves usage in food.^[10] *Murraya koenigii* is a culinary important plant of Indian origin, and also been used in the Ayurvedic system of medicine since many centuries. Some of the notable pharmacological activities of the plant are carbazole alkaloids which are abundantly present in the leaves, fruits, roots and bark of this plant, have been reported for their antidiabetic, anticancer, antibacterial, and anti-nociceptive and antioxidant activities.^[10]

CONCLUSIONS

Curry leaves have no harmful effect on both liver and kidney functions.

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Ethics approval: The study was approved by the Ethics Committee for research in human, Saveetha University, and Chennai, India (Approval no: 06/06/2015/IEC/SU).

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