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IMPACT OF CURRY LEAVES (*MURRAYA KOENIGII*) CHUTNEY SUPPLEMENTATION ON HYPERTENSIVE SUBJECTS

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ABSTRACT

Curry leaves (*Murraya koengii*) belongs to *Rutaceae* family. Green curry leaves are one of the most commonly used spices in India. Chemical compounds present in curry leaves are mahanimbine, murrayanol and mahanine. The texture of curry leaves are slightly hard therefore curry leaves are generally discarded from dish while eating; ultimately the amount consumed is less. However, the curry leaves powder prepared is nutritious, convenient and easy to store. Thus an attempt was made to prepare the curry leaves chutney utilizing bengal gram and black gram dhal to ensure minimum five gram consumption of curry leaves powder in the daily diet. Forty hypertensive subjects were selected for clinical study. They were divided into two groups, experimental and control. Each group consists of 20 subjects. The supplementation of 10 gram of curry leaves powder chutney (containing 5 gram of curry leaves powder) was given daily for a period of 60 days to the experimental group. The observations of blood pressure were recorded at 0, 30 and 60 days of the experimental period. The supplementation of curry leaves chutney showed improvement in the blood pressure levels, systolic (147 mm Hg to 130 mm Hg) and diastolic (93 mmHg to 83 mmHg) at the end of experimental period. This novel utilization of abundantly available curry leaves can be en-cashed as a value added product which is associated with healthy life by reducing blood pressure.

Keywords: Curry leaves powder, chutney, supplementation, and hypertension.

INTRODUCTION

The world is rich with natural and unique medicinal plants. Since ancient times a number of Indian medicinal plants have been used globally but medicinal plants are now getting more attention than ever because they have potential of myriad benefits to society and to all mankind especially in the line of medicine and pharmacology. Medicinal value of these plants lies in phytochemical constituents. Phytochemical is a natural bioactive compound which produces definite physiological action on the human body and in combination with nutrients and fiber protect against diseases. Some of the most important phytochemicals are alkaloids, flavonoids, tannins, terpenoids, saponins, phenolic compounds, glycosides, eugenol, ursolic acid, mahanine, murrayanol, mahanimbine and many more.

Green leafy vegetables are less expensive and easily available source of micronutrients. The ethno-botanical reports offer information on medicinal properties of green leafy vegetables like anti-diabetic (Kesari et al., 2005), antihistaminic (Yamamura et al., 1998), anti-carcinogenic (Kumar et al., 2002), hypolipidemic (Khanna et al., 2002) and possess anti-bacterial activity (Kubo et al., 2004). India have variety of natural climates and seasons and has number

of nutritionally and medicinally important plant species such as spinach, coriander, amaranth, curry leaf and mint which are relatively inexpensive and readily available throughout the year.

The curry leaf (*Murraya koenigii*) is found growing throughout India. It belongs to the family *Rutaceae*. Interest in greater use of curry leaf has been stimulated since its high antioxidant potential and characterizing authentic flavor and distinct aroma. Antioxidant activity of curry leaf is attributed to mahanimbine and murrayanol and mahanine. The leaves of the plant are employed extensively as flavoring agent in curries like *dal*, *samber*, *rasam*, *chutneys* and also used in preparation of beauty cream, soap and perfumes (Prajapati et al., 2003). It has a strong medicinal effect in the treatment of high blood pressure.

Hypertension is one of the principal problems in the society. It is a silent killer whose onset of complication is insidious. Many complications associated with hypertension such as cardiac remodeling, hypertrophy renal impairment, nephropathies and ocular complications such as retinopathies and cardiovascular accident or stroke. Its prevalence is increasing especially in developing countries where adoption

of western life styles and stress of urbanization is more (Castelli, 1984). Excess consumption of alcohol, salt, saturated fat and lack of exercise are also contributing factors. Hypertension is a strong risk factor for cardiac and blood vessel damage and is associated with high morbidity and mortality.

Curry leaves are generally used in very small quantities for seasoning, because of a slightly hard texture curry leaves generally discarded from the dish while eating. Hence, the nutrition potential of curry leaves remains underutilized. It is better to promote curry leaves in an edible form where larger quantities, can be incorporated in the diet as it is less expensive and easily available. One way to ensure greater consumption of curry leaves to use curry leaves in dried form. Drying of curry leaves also ensure shelf stability, convenience for use when required and make it nutrient dense. In spite of its medicinal importance, the usefulness to mankind has remained unexploited from commercial and domestic purpose.

Except few studies, data on reduction in blood pressure by medicinally important plant is scanty. Therefore it is considered worthwhile to put efforts to develop the curry leaves powder chutney and to evaluate the impact of supplementation of curry leaves chutney on blood pressure of selected hypertensive subjects.

MATERIALS AND METHODS

The present study was carried out in the department of Foods and Nutrition, College of Home Science, Marathwada Krishi Vidyapeeth, Parbhani, (M.S.). Curry leaf for its characterizing authentic, flavoured and distinct aroma is used by Indians. Interest in greater use of curry leaves has been stimulated since its high antioxidant property and potential. However scanty studies are available to prove the clinical importance in the management of hypertension. Keeping this in view, the present study was designed to evaluate the utilization and health benefit effect of supplementation of curry leaves chutney on hypertensive subjects. Curry leaves chutney was prepared using the food stuffs having medicinal, antioxidant, curative properties and rich in micronutrient. The ingredients used for the preparation of chutney were bengal gram (*Cicer arietinum*) and black gram dhal (*Phasleolus mungo*), cumin seeds (*Cuminum cyminum*) and chili powder.

A total number of forty hypertensive subjects following purposive sampling technique were selected for the present study. They were divided in to two groups, experimental group (20) and control group (20). The selected subjects were allowed to continue and follow their usual living style, diet, exercise and medicines during the study period. The experimental group was supplemented 10 gm of curry leaves chutney for a period of 60 days where as control group did not received the curry leaves chutney. Periodic observations of blood pressure were recorded at 0, 30 and 60 days for both the groups using sphygmomanometer (Steidl and Bratton, 1968).

To determine the impact of supplementation of curry leaves chutney at 0, 30th and 60th days of experiments on the blood pressure of selected subjects, the mean, range and standard error was calculated. The difference between 0, 30th and 60th days of experimental and control group and also the difference between initial and final values of experimental vs. control group were compared by applying 't' test (Panse & Sukhutme 1981).

RESULTS AND DISCUSSION

In recent years, there is a tremendous interest in the possible role of nutrition in prevention of disease. Therefore an effort to manage hypertension without side effects was tried by supplementing the curry leaves chutney.

The mean values of systolic and diastolic blood pressure of the experimental group before (0 days) and after (30 and 60 day) supplementation of curry leaves chutney are presented in Table 1 and illustrated in Figure 1 and 2. The subjects were found to have the initial value of systolic and diastolic blood pressure in the range of 138 - 162 mm Hg and 90 - 100 mm Hg respectively.

Initially the mean recorded value for systolic blood pressure was 147 ± 1.93 and diastolic pressure was 93 ± 0.87 mm Hg. After 30 days of supplementation of curry leaves chutney the value of systolic blood pressure was found to be decreased to 136 ± 2.14 mm Hg and that of diastolic blood pressure was 89 ± 0.62 mm Hg. The difference between systolic and diastolic blood pressure at 30 days from their initial values was statistically significant ($P < 0.01$).

Table 1- Blood pressure of experimental group before and after supplementation (n=20)

Blood pressure	Zero days (Before)		30 days		60 days (After)	
	Range	Mean \pm SE	Range	Mean \pm SE	Range	Mean \pm SE
Systolic (mm of Hg)	138-162	147 ± 1.93	124 - 154	136 ± 2.14	122 - 142	130 ± 1.72
Diastolic (mm of Hg)	90 - 100	93 ± 0.87	84 - 94	89 ± 0.62	80 - 90	86 ± 0.70

Values of blood pressure (Student's paired 't' test		
Days	Systolic (mm of Hg)	Diastolic (mm of Hg)
Zero Vs 30 days	13.315**	6.403**
30 Vs 60 days	6.328**	5.253**
Zero Vs 60 days	20.775**	7.400**

**Significant at 1% level NS Non Significant

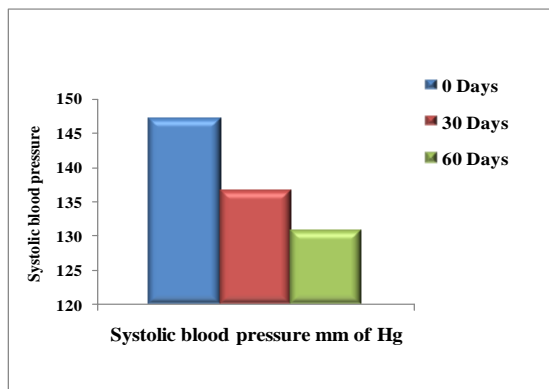


Fig.1. Systolic blood pressure of experimental group before and after supplementation

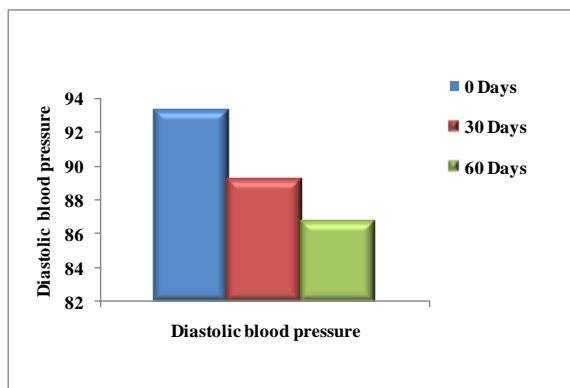


Fig.2. Diastolic blood pressure of experimental group before and after supplementation

When supplementation was continued up to 60 days, further slight reduction in the value of blood pressure was noticed. After mean value of systolic blood pressure was 130 ± 1.72 mm Hg and that of diastolic blood pressure it was 86 ± 0.70 mm Hg.

When the values of 30 days were compared with the values obtained at 60 days of supplementation after supplementation of curry leaves chutney the difference noticed was statistically significant ($P < 0.01$) for both systolic and diastolic blood pressure.

Curry leaves improve functioning of the stomach and small intestine and promote their action. They improve

the quality of digestive juice secreted during digestion. Their smell, taste and visual impression initiates salivary secretion and peristaltic waves, which is the first step in good digestion. They are mildly laxative and can tackle multiple digestive problems. In case of digestive upset, buttermilk enriched with the paste of curry leaf, common salt and cumin seed powder is recommended (Goswami and Kulkarni, 2006). Further they inferred that curry leaves reduces blood pressure and blood cholesterol by acting on angiotensin cell enzyme. Thus curry leaves is one of the best home reduce blood pressure after remedies.

Similar findings are also observed by Mamilla and Khan (2009) that the administration of herbal composite containing curry leaves, safflower petals, tulsi leaves and amla showed decrease in systolic blood pressure by 20 mm Hg and decreased diastolic blood pressure by 11 mm Hg. The change in mean values of blood pressure of experimental and control group before and after supplementation of curry leaves chutney are presented in Table 2 and illustrated in Figure 3 and 4.

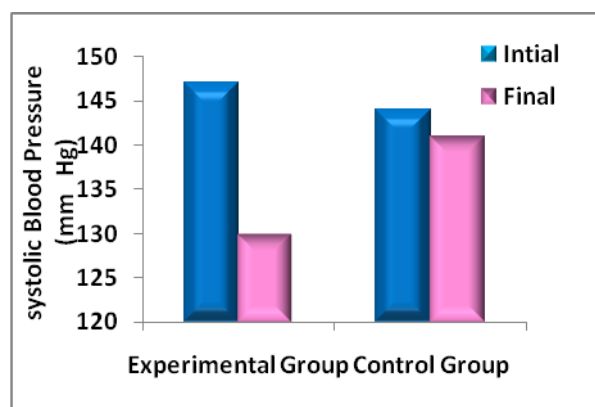


Fig.3. Systolic blood pressure of experimental and control group before and after supplementation

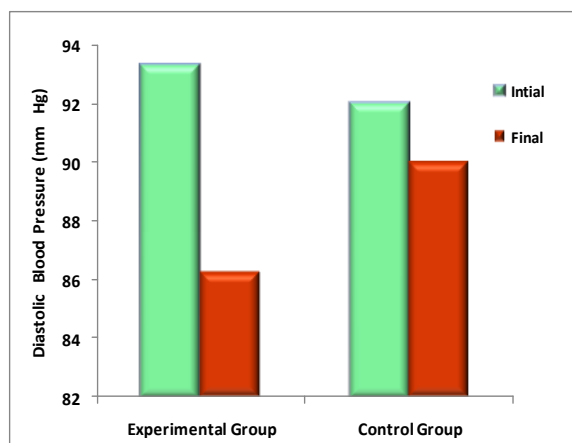


Fig.4. Diastolic blood pressure of experimental and control group before and after supplementation

Table 2- Blood pressure of experimental and control group before and after supplementation (n=40)

Blood pressure	Mean \pm SE		Difference	't' Value	
	Initial (0 days)	Final (60 days)		I Vs F (0 Vs 60 days)	E Vs C (60 days)
Systolic (mm of Hg)					
Experimental	147 \pm 1.93	130 \pm 1.72	16 \pm 0.21	20.77**	
Control	144 \pm 1.56	141 \pm 1.33	2 \pm 0.23	1.40 ^{NS}	6.73**
Diastolic (mm of Hg)					
Experimental	93 \pm 0.87	86 \pm 0.70	7 \pm 0.17	7.40**	
Control	92 \pm 0.70	90 \pm 0.75	2 \pm 0.1	1.36 ^{NS}	5.12**

t' values of blood pressure (Student's paired 't' test), I-Initial F-final E-experimental C- Control,

**Significant at 1% level NS-Non Significant

The results of supplementation of curry leaves chutney indicated the decrease in systolic (16 \pm 0.21 mm Hg) and diastolic (7 \pm 0.17 mm Hg) blood pressure in case of experimental group at 60 days. When the initial blood pressure values were compared with final blood pressure values, the mean decrease in systolic and diastolic blood pressure was found statistically significant (P < 0.01).

On the contrary, the respective values recorded for control group were non- significant. Comparison of mean decrease in systolic and diastolic blood pressure between the experimental group and control group showed significant at 1 per cent level.

Spices are good adjuncts that have been used as flavoring and coloring agents and as preservatives for thousands of years. Spices have also been recognized to possess medicinal properties and their use in traditional system of medicine has been on record for long time. With advancement in the technology of spices and on knowledge of the chemistry and pharmacology of their active principles, their health benefit effects were investigated more thoroughly in recent decades. These studies documented stimulant action, hypolipidemic effect, antidiabetic influence, antioxidant potential, antiinflammatory property, antimutagenic, and anticarcinogenic potential of spices. Among these, the hypocholesterolemic and antioxidant properties of a few specific spices have far-reaching nutraceutical value. These beneficial physiological effects also have the potential of possible therapeutic application in variety of disease conditions.

This study with dried curry leaves powder reaches the conclusion that it is possible to utilize small amounts of curry leaves powder in the form of chutney to enhance the daily intake of green leafy vegetables. The benefits of incorporating curry leaves powder in chutney preparation are manifold. Curry leaves can be conveniently dried in shade and store for use as an herb throughout the year, unlike fresh curry leaves that are perishable. Dried curry leaves powder is suitable for adding value, color, appearance flavor to many foods. Further curry leaves powder can be incorporated in spices mixture to add flavor, color and taste too many vegetable and rice dishes. However, in view of many promising health beneficial attributes green leafy vegetables

are considered as best, easiest and most natural weapon to fight against the daily scourge diseases.

CONCLUSIONS

In conclusion India is a developing country with a large portion of people suffering from various diseases and living with poor health infrastructures. The costs for therapeutic treatment have compelled the people to look for alternative cost effective methods to minimize the associated complications. Medicinal plants constitute a principal healthcare resource corroborating their gradual acceptance by the global population in the treatment of various ailments. The curry leaves are low cost and abundantly available. Further the value addition of curry leaves powder helps in exploitation of curry leaves for better utilization and acceptance besides enhancing nutritional contribution and exerting beneficial health effects by reducing the blood pressure. The marked reduction observed in the values of blood pressure with curry leaves powder chutney may be attributed to the presence of compounds in curry leaves.

Thus present study confirms that supplementation of curry leaves powder chutney have a modulating role in treatment of hypertension and confirm a part of therapy in its management.

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