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SUPPLEMENTARY EFFECT OF ROSELLE TEA ON HYPERTENSIVE SUBJECTS

P.Nazni[*] and S.Vimala

Department of Food Science, Periyar University, Salem, Tamilnadu, India

[*]Corresponding author: naznifsn@gmail.com

ABSTRACT

Roselle (Hibiscus sabdariffa *Linn*.) is a tropical plant widely cultivated in Thailand and locally known as Krachiap Daeng. The roselle plant parts have also been reported to be folk remedy for cancer, obesity, diabetes and hypertension. Hence the present study is undertaken to analysis the physiochemical, sensory evaluation and its supplementary effect of the rosella tea. Result of the supplementation study revealed that there was reduction in both systolic and diastolic blood pressure in experimental group compared to the control group. Drinking herbal tea lowers the blood pressure of pre hypertensive and mildly hypertensive adults, hence it plays a role in controlling blood pressure. The present study suggested that consumption of hibiscus tea will helps to reduce the hypertension.

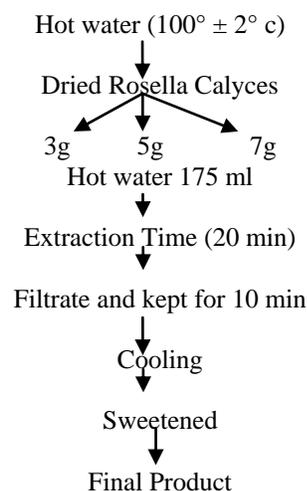**Key words:** Roselle, Sabdariffa, Hypertension, Blood Pressure.

INTRODUCTION

Roselle (Hibiscus sabdariffa *Linn*.) is a tropical plant widely cultivated in Thailand and locally known as Krachiap Daeng. Roselle calyx contains a rich source of dietary fiber, vitamins, minerals and bioactive compounds such as organic acids, phytosterols, and polyphenols, some of them with antioxidant properties. The phenolic content in the plant consists mainly of anthocyanins like delphinidin-3-glucoside, sambubioside, and cyanidin- 3- sambubioside mainly contributing to their antioxidant properties (Aurelio *et al.,* 2007). The roselle plant parts have also been reported to be folk remedy for cancer, obesity, diabetes and hypertension (Hirunpanich *et al.,* 2006). The calyces are rich with anthocyanins and used for making jelly, jam, preserve and beverages (Hirunpanish *et al.,* 2006). Roselle anthocyanins are a good source of antioxidants as well as a natural food colourant. (Adhikari *et al.,* 2004). The water extract of the red flowered species of Roselle is widely used in the preparation of fruit drink because of its unique and appealing characteristic color and flavor (Fasoyiro *et al.,* 2005).

The increased consumer awareness of food quality has emphasized the need to optimize the drying process (Banga *et al.,* 1994). The hypertension was defined according to Fifth report Joint National Committee for detection, evaluation and treatment of high blood pressure, as systolic BP more than or equal to 140 mm of Hg or diastolic blood pressure more than or equal to 90 mm of Hg or those individuals currently taking antihypertensive treatment (White PD *et al.,*1990).

MATERIALS AND METHODS

The fresh Rosella Calyces were collected from local market of Salem. Fresh flowers were selected, cleaned and dried using oven for 15 min.

Hot water (100° ± 2° c)

↓

Dried Rosella Calyces

↓

3g   5g   7g

Hot water 175 ml

↓

Extraction Time (20 min)

↓

Filtrate and kept for 10 min

↓

Cooling

↓

Sweetened

↓

Final Product

PHYSIO-CHEMICAL ANALYSIS OF ROSELLA CALYCES

The Physiochemical parameters of the three variations of rosella tea such as colour intensity was

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determined using an absorption calorimeter, pH using pH meter, ascorbic acid and total titrable acidity determined using AOAC method and total solids by standard method.

SENSORY EVALUATION OF ROSELLA CALYCES

All the three developed Rosella beverage samples were evaluated for their sensory qualities. The 20 member taste panel was requested to rate the sample using a nine-point hedonic score card (i.e 9=like extremely; 5=neither like nor dislike; 1=dislike extremely). The scores from the rating were subsequently subjected to analysis of variance (ANOVA) and means separated using Duncans Multiple Range test (IFT, 1981; Meilgaard et al., 1991).

SUPPLEMENTATION STUDY

The supplementation study was carried out by 50 adult patient of both male and female belonging to the age group of 30-60 years from M.G.Hospital, Salem. The socio-economic status of the selected patients was collected through questionnaire. Patient having history of coexisting diabetes, coronary heart disease, obesity, etc was not included in the study. Counselling of the patients about the study was done and informed consents were taken from the patients. The patients were divided into two groups: one group receives herbal tea (experimental group n=25) and another group black tea (control group n=25). They receive 150ml of herbal tea or 150ml of black tea infusion two times a day (total 300ml per day) for a period of 30 days. The impact of supplementation was analyzed using both clinical and biochemical estimation before and after supplementation. T he clinical parameters such as body mass

index, systolic and diastolic pressure and lipids parameters such as serum cholesterol, LDL, VLDL, HDL and serum triglyceridese were analyzed on the initial and 30th day of the supplementation.

STATISTICAL ANALYSIS

All the analysis reported in this study was carried out in triplicates. In each case, a mean value and standard deviation were calculated. Analysis of variance (ANOVA) was also performed and separation of the mean values was carried out using Duncan Multiple Range Test at $p<0.05$.

FINDINGS

PHYSIO CHEMICAL AND ORGANOLEPTIC EVALUATION OF THE DEVELOPED ROSELLE TEA

The results of the physio-chemical parameters of the three developed tea showed that, the colour intensity was ranged from 0.301-1.367, pH 4.29-6.80, ascorbic acid 25.20-29.87 mg, Total solids 1.14-3.47, total titrable acidity 0.269-1.440 respectively in Herbal (Roselle) Tea.

Among the three variations, second variation with 5 grams of dry calyces from Roselle was found to be organoleptically acceptable and selected for supplementation.

SUPPLEMENTARY IMPACT OF THE SELECTED ROSELLE TEA

The socio-economic factor such as age, gender, type of family, educational qualification and income level were shown in table-1.

Table-1 - Socioeconomic factors of the selected subjects

Sl. No	Socioeconomic Factors	Criteria	Male (25)		Female (25)	
			N	%	N	%
1.	**Age**	31-40	11	44	9	36
		41-50	8	32	7	28
		51-60	6	24	9	36
2.	**Gender**		25	100	25	100
3.	**Type of family**	Nuclear	11	44	13	52
		Joint	14	56	12	48
4.	**Educational Qualification**	Literate	15	60	14	56
		Illiterate	10	40	11	44
5.	**Income level**	Low income <Rs. 4500	12	48	9	36
		Middle income <Rs 4500-7500	8	32	9	36
		High income >Rs. 75000	5	20	6	24

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Table – 2 - Percentage distribution of the subjects belonging to experimental group and control group based on lifestyle pattern

Parameters		Experimental group (n=25)		Control group (n=25)	
		N	%	N	%
Exercise	Yes	17	68	0	0
	No	8	32	25	100
Types of exercises performed	Walking	13	52	0	0
	Yoga	3	12	0	0
	Gym	2	8	0	0
	Nil	7	28	25	100

N= number of samples, %= percentage

Nuclear 44% and joint family 52% system was observed among the selected subjects. The result of the educational status revealed that 58% of the subjects were literate 42% of the subjects were illiterate. Regarding family income 42% of the families had low monthly income, 35% had the middle income level and 23% were in the high income level. The effect of educational level on non-compliance was equivocal after reviewing thirteen articles which focused on the impact of educational level as they used different criteria for "higher" and "lower" education. Several studies found that patients with higher educational level might have higher compliance (Ghods and Nasrollahzadeh, 2003), while some studies found no association (Wai *et al.,* 2005).

Among the selected subjects, in experimental group, 68 percent of the subjects perform physical exercise and 32 percent do not perform any exercise. In control group, none of the subject performs any physical exercise.

Recently, Yusuf *et al.,* (2000) reported that, among others, smoking, dietary habits and alcohol intake, as well as regular physical activity account for most of the risk of myocardial infarction worldwide in both sexes and at all ages in all regions. A positive association was observed between prevalence of hypercholesterolemia and smoking habits (p =0.03), hypertension (p= 0.07), obesity (p=0.06), while an inverse association was observed between hypercholesterolemia and alcohol drinking (p = 0.04).

Table-3 - Comparison of systolic blood pressure levels and diastolic blood pressure levels of the subjects belonging to experimental and control group

Blood Pressure	Groups	Mean ± Standard deviation		t-value	Level of significance
		Initial	Final		
Systolic blood pressure	Experimental group	155.20±11.470	152.70±10.470	0.339	NS
	Control group	152.34±11.612	151.24±11.012		
Diastolic blood pressure	Experimental group	101.25±11.09	98.05±8.39	0.391	NS
	Control group	102.32±9.312	101.12±9.312		

NS-Not significant

Table-4 - Comparison of biochemical parameters of the subjects belonging to experimental and control group between the test period of 1st day and 30th day of the supplementation

Biochemical Parameters	Control group (n=25)		Experimental group (n=25)	
	Initial 1st day	Final 30th day	Initial 1st day	Final 30th day
Total cholesterol (mg/dl)	172.67 ± 0.41	171.31±0.35	115.25±0.10	113.10±0.32
Triglycerides (mg/dl)	126.82±0.31	126.79±0.55	101.67±0.63	99.11±0.11
Low density lipoprotein (mg/dl)	103.37±0.24	103.36±0.44	112.77±0.44	110.61±0.52
High density lipoprotein (mg/dl)	45.33±0.09	44.31±0.56	42.89±0.71	43.74±0.66
Very low density lipoprotein (mg/dl)	29.57±31	28.99±0.81	22.87±0.31	20.91±0.56

The above table reveals that, the initial value of the systolic pressure of the experimental group was 155.20 ± 11.470mmHg and control group was 152.34 ± 11.612 mmHg while the final value of 152.70 ± 10.470mmHg and control group was 151.24 ± 11.012mmHg respectively. The initial value of the diastolic pressure of the experimental group was 101.25 ± 11.09mmHg and control group was 102.32 ± 9.312 mmHg while the final value of 98.05 ± 8.39mmHg and control group was 101.12 ± 9.312 mmHg. There was a reduction in both systolic and diastolic blood pressure, but more reduction was observed in experimental group compared to control group which was not statistically significant. Many prospective studies based on Hibiscus sabdariffa have proven the efficacy of hibiscus tea on hypertension. Fifty three adult men with mild to moderate hypertension were taken and herbal tea was given in the form of sour tea and asked to consume 150ml of the tea. There was significant reduction in the systolic and diastolic blood pressure by 12mmHg and 9mmHg respectively (Ali *et al.,* 2001).

Result showed that after the supplementation of hibiscus tea for 30 days for the experimental group subjects, Total cholesterol (mg/dl), Triglycerides (mg/dl), Low density lipoprotein (mg/dl), High density lipoprotein (mg/dl) and Very low density lipoprotein (mg/dl) were reduced compared to the control group. Many prospective studies have revealed the beneficiary effects of hibiscus tea in the serum triglyceride levels. Consuming 200ml of hibiscus tea per day for a period of 45 days drastically lowered the serum triglyceride levels of the moderate hyperlipidemic adult men (Gurrola *et al.,* 2009). In a study of 70 mild or moderate hyperlipidemic subjects consuming two or three cups of hibiscus tea (5g/day, 45 days) had plasma triglyceride levels decreased by 9-16 percent (Duck, 2005).

CONCLUSION

In the present study, hibiscus tea was prepared which controls the blood pressure, boots up the immune system and may also reduce cholesterol by dilating blood vessels. Drinking hibiscus tea lowers the blood pressure of pre hypertensive and mildly hypertensive adults, hence it plays a role in controlling blood pressure. The present study suggested that consumption of hibiscus tea will helps to reduce the hypertension. It has been suggested that hibiscus tea can prevent constipation and promote weight loss. The hibiscus tea is an excellent beverage to improve many areas of health.

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