

To Study the Effect of Sour Tea (*Hibiscus Sabdariffa*) on Blood Pressure in Prehypertensive Patients

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| Received: 19.01.2020 | Accepted: 28.01.2020 | Published: 11.02.2020

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Abstract

Original Research Article

Essential hypertension (also called primary hypertension or idiopathic hypertension) is the most common type of hypertension, affecting 95% of hypertensive patients. Hypertension (HT) is an important public health problem worldwide and it tends to be familial and is likely to be the consequence of an interaction between environmental and genetic factors. Prevalence of essential hypertension increases with age and individuals with relatively high blood pressure at younger ages are at increased risk for the subsequent development of hypertension and it makes them suffer a lot. Aim of present study was to see the effect of sour tea (*hibiscus sabdariffa*) on blood pressure in prehypertensive subjects. Selected 100 patients following JNC7 criteria were given *hibiscus sabdariffa* tea on daily basis for two months. Systolic and diastolic blood pressure had shown a significant decrease after sour tea supplementation. In folk medicine, the HS calyx extracts are used for the treatment of several complaints, including high blood pressure, liver diseases and fever.

Keywords: *Hibiscus sabdariffa* (HS), Systolic blood pressure (SBP), Diastolic blood pressure (DBP).**Copyright © 2020:** This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

INTRODUCTION

Hypertension is one of the most prevalent and important health problems in developed as well as developing countries [1]. Overall 18–54% of the world's population are hypertensive [2, 3]. Twelve percent of the deaths are caused by hypertension and its direct effects. Twenty percent of the general population should expect to have high blood pressure during their life [4, 5]. In 90% of cases the etiology of hypertension is unknown, this is called essential hypertension. Hypertension causes end organ damage to the heart, kidneys and the central nervous system (atherosclerosis occurs in 30% of the cases and congestive heart failure, stroke, renal failure and retinopathy in more than half of the cases). In mild hypertension also the risk of side effects are high without treatment. Hypertension is a progressive and fatal disease [6]. Hypercholesterolemia, resulting from cholesterol metabolic changes, is a major cause of cardiovascular disturbance, such as atherosclerosis and coronary heart disease [7, 8]. Many studies have assumed preventive or protective role of *Hibiscus sabdariffa* (HS) tea in hypertension. It is assumed that the active dietary constituents contributing to these protective effects are antioxidant nutrients such as α -tocopherol, β -carotene, polyphenols and

anthocyanins [9-12]. Non-pharmacological treatments such as diet, exercise, relaxation and yoga are also used for controlling mild hypertension. Dietary HSE may reduce the incidence of atherosclerosis through their antioxidant activity. Sour tea (*Hibiscus sabdariffa*) is a genus of the Malvaceae family. It has been called by different local names in various countries. In English-speaking countries it is named roselle or red sorrel and in Arabic it is called karkade. In Iran, it is mainly known as sour tea. The phytochemical, pharmacologic and toxicologic properties of *Hibiscus sabdariffa* have been investigated in many studies. The calyces of *Hibiscus sabdariffa* are used in many parts of the world to make cold and hot drinks. Sour tea contains many chemical constituents including alkaloids, L-ascorbic acid, anisaldehyde, anthocyanin, β -carotene, β -sitosterol, citric acid, cyanidin-3 rutinoside, delphinidin, galactose, gossypetin, hibiscetin, mucopolysaccharide, pectin, protocatechuic acid, polysaccharide, quercetin, stearic acid and wax. In folk medicine, the calyx extracts are used for the treatment of several complaints, including high blood pressure, liver diseases and fever. In view of its reported nutritional and pharmacologic properties and relative safety, *Hibiscus sabdariffa* and compounds isolated from it

could be a source of therapeutically useful products [14-16].

AIMS AND OBJECTIVES

- To study the effect of hibiscus tea on blood pressure in prehypertensive individuals.

MATERIAL AND METHOD

This is a cross-sectional study and carried out in the department of physiology and department of medicine, S.P. Medical College and attached group of hospitals, Bikaner (Rajasthan). The study was conducted on patients with pre-hypertension. The duration of study was two months.

Selection of Patients

100 subjects (between 35-60 years) with prehypertensive selected for study after fulfilling inclusion criteria.

Inclusion Criteria

All nonsmoking patients of either sex with systolic BP (SBP) 120-139 mmHg and diastolic BP (DBP) 80-89 mmHg following JNC7 criteria.

RESULT

Table-1: Distribution of cases according to SBP (Prehypertensive) Pretreatment and Post treatment

STUDY	Group A (Prehypertensive)		T value	p-value
	Pre-treatment MEAN±SD	Post Treatment MEAN±SD		
SBP (mm of Hg)	132.34±4.36	127.76±4.31	7.471	0.0001

The above table depicts that the mean value of SBP was 132.34±4.36 during pretreatment and

Exclusion Criteria

Patients with secondary hypertension and underlying diseases such as cardiovascular abnormalities, thyroid diseases or diabetes and those who are consuming more than two antihypertensive drugs were excluded from this study.

Data Collection

This study was conducted after ethical approval by the Rajasthan University of health & sciences, Jaipur. An informed consent was obtained from all participants.

FORMULATION OF HIBISCUS TEA

Sour tea (*Hibiscus Sabdariffa*) is prepared by taking 2 spoonfull of blended (powder) tea per glass brewed in boiling water for 20-30 minutes.

PROCEDURE

The subjects included are consuming one class daily of HS tea prepared for two months. And subjects has been assessed for systolic blood pressure (SBP) and diastolic blood pressure (DBP) before starting the intervention and after two months of intervention.

127.76±4.31 during post treatment and the difference of mean was statistically highly significant (p=0.0001).

Table-2: Distribution of cases according to DBP (Prehypertensive) Pretreatment and Post treatment

STUDY	Group A (Prehypertensive)		T value	p-value
	Pre-treatment MEAN±SD	Post Treatment MEAN±SD		
DBP (mm of Hg)	83.00±2.39	82.28±2.54	5.917	0.040

The above table depicts that the mean value of DBP was 83.00±2.39 during pretreatment and 82.28±2.54 during post treatment and the difference of mean was statistically significant (p=0.040).

DISCUSSION

This study was done to see the effect of hibiscus sabdariffa extract on blood pressure of prehypertensive subjects after fulfilling above mentioned inclusion criterias. It was observed that in prehypertensive subjects there was a significant change in the blood pressure of prehypertensive subjects. This concludes the therapeutic effect of HS extract on blood pressure in prehypertensive subjects.

In our study the mean value of SBP in prehypertensive patients (Group A) is 132.34±4.36 during

pre-treatment phase (before administration of HS extract) and 127.76±4.31 during post-treatment phase (after administration of HS extract) and the p-value of the two was found to be highly significant (p=0.0001). This result was similar to the study conducted by Mc Kay *et al.*, in 2010, where they have examined the antihypertensive effects of *H. sabdariffa* (hibiscus tea) consumption in humans [17]. The potential mechanisms of action for the BP-lowering effect of *H. sabdariffa* were not determined in our study but have been explored by others. In vitro and animal studies show that *H. sabdariffa* is a vasorelaxant, perhaps via action on calcium channels, an ACE inhibitor and a diuretic. The ACE inhibitor activity and natriuretic effects of *H. sabdariffa* have also been observed in human studies. Other potential mechanisms of action related to the effects of the anthocyanins present in *H. sabdariffa* are also possible [18-21].

In our study the mean value of DBP in prehypertensive patients (Group A) is 83.00 ± 2.39 during pretreatment phase (before administration of HS extract) and 82.28 ± 2.54 during post-treatment phase (after administration of HS extract) and the p-value of the two was found to be significant ($p=0.040$). This result was similar to the study conducted by Walton *et al.*, in 2016, where they found a significant decrease in diastolic blood pressure (DBP) [22].

Herrera-Arellano *et al* in 2007 found that there was no significant difference between the aqueous extract from rosella (standardised to 9.62 mg of total anthocyanins/dose/day) and captopril (25 mg every 12 hour). In other follow-up study, Herrera-Arellano *et al.*, found that rosella had a 65.1% therapeutic effectiveness and 100% tolerability, although rosella did not reduce blood pressure to the same degree as Lisinopril [23].

Mozaffari-Khosravi *et al.*, in 2013 found that rosella significantly reduced systolic and diastolic blood pressure ($p < 0.001$), but there was no statistically significant difference between the effects from green tea [24]. Faraji *et al.*, in 1999 found there was a dose-dependent response in tea drinkers [25]. Al-Shafei *et al.*, in 2013 found that SBP, DBP and left ventricular hypertrophy were significantly reduced during treatment, but returned to pre-treatment values indistinguishable from baseline four weeks post-treatment [26].

Beennet *et al.*, in 1996 proposed blood pressure decreasing mechanism of HSE as follows: angiotensin converting enzyme inhibitors inhibit the effect of the enzyme on angiotensin I, therefore, angiotensin II is not produced and aldosterone is not released from the adrenal gland, which may eventually cause a decrease in vascular resistance. The inactivation of angiotensin converting enzyme inhibits the inactivation of bradykinin, a vasodilator hormone. Simultaneously the level of vasodilator prostaglandins increase [27].

CONCLUSION

This study has been done with the aim of evaluating therapeutic effect of HSE on blood pressure level of pre-hypertensive subjects. We concluded that HSE when given for a period of two months had improved the blood pressure of pre-hypertensive subjects. These findings still suggest the significant therapeutic effect of HSE on blood pressure. And this can be an adjunctive to conventional treatment of hypertension atleast on pre-hypertensive group. Also this natural extract can be consumed by the general population to prevent the risk of hypertension and atherosclerosis in future. Though further mechanism of action and other related effects should be done in future.

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