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File: ■ Hibiscus (*Hibiscus sabdariffa*, Malvaceae)
■ Blood Pressure
■ Hydrochlorothiazide

HC 111521-533

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RE: **Hibiscus Extract Decreases Blood Pressure to a Greater Extent than Hydrochlorothiazide in Nigerian Patients with Mild to Moderate Hypertension**

Nwachukwu DC, Aneke E, Nwachukwu NZ, Obika L, Nwagha UI, Eze AA. Effect of *Hibiscus sabdariffa* on blood pressure and electrolyte profile of mild to moderate hypertensive Nigerians: a comparative study with hydrochlorothiazide. *Niger J Clin Pract*. November-December 2015;18(6):762-770.

Hypertension is one of the risk factors of cardiovascular disease and the main risk factor for stroke. It affects approximately 20% of the world's population with more severe sequelae among individuals of African descent. Hypertension is likely the result of many physiologic changes which include changes in electrolyte concentrations in the blood. Blood concentrations of sodium and chloride ions are higher and potassium ions are lower in patients with hypertension than in individuals with normal blood pressure. One common method of treating hypertension involves the reduction of blood electrolytes with prescription medications, such as hydrochlorothiazide (HCTZ). Studies in animal models and in humans provide evidence that hibiscus (*Hibiscus sabdariffa*, Malvaceae) extracts can help lower blood pressure. The goal of this randomized, controlled study was to compare the effects of a hibiscus extract and HCTZ on blood pressure and electrolyte balance in Nigerian patients with mild to moderate hypertension.

Patients were recruited from the Medical Outpatient Clinic of the Enugu State University Teaching Hospital in Enugu, Nigeria. Patients were included if they had newly diagnosed mild to moderate hypertension. Patients were excluded if they were taking prescription medications for hypertension; had diabetes, nephropathy, hepatic disease, cardiopathy, or cancer; were pregnant; smoked; or were alcoholics. Patients were randomly assigned to 1 of 3 groups, which included a placebo group, a group that drank hibiscus tea, and a group that took HCTZ. Each treatment was administered once per day before breakfast for 4 weeks. The placebo contained an extract of black currant (*Ribes nigrum*, Grossulariaceae) (GlaxoSmithKline®; London, UK) that was diluted until the solution matched the color of the hibiscus extract. A preliminary study found that the black currant dose had no effect on blood pressure. For each day's supply of hibiscus extract, 20 g of dried calyces, obtained from the Ogbete Main Market in Enugu, were ground into a powder and then infused with 1 L of boiling water for 30 minutes. The extract was filtered and stored in the refrigerator. The extract was standardized to a total anthocyanin concentration of 10.04 mg from 20 g of calyces in 1 L. The HCTZ group took 25 mg of HCTZ (Esidrex®; Novartis Pharmaceuticals;

Basel, Switzerland). Blood pressure, serum electrolytes, and urine electrolytes were measured at baseline; at 1, 2, 3, and 4 weeks during the study; and 1 week after the study ended. Data were analyzed with one-way analysis of variance and Bonferroni tests.

Eighty patients were recruited for the study, of which 75 completed the study. Both hibiscus and HCTZ decreased systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) compared to placebo. HCTZ significantly reduced SBP by 12.9 ± 4.31 mmHg and DBP by 9.50 ± 2.06 mmHg ($P < 0.05$ and $P < 0.001$, respectively). There was an even greater reduction in SBP (17.08 ± 5.12 mmHg) and DBP (11.12 ± 3.12 mmHg) with the hibiscus treatment than with HCTZ, and these measures also were significantly lower than the placebo ($P < 0.001$ for both). MAP also was significantly lower in the hibiscus and HCTZ groups than in the placebo group at the end of the study ($P < 0.001$ and $P < 0.01$, respectively). Serum sodium and potassium were significantly lower at the end of the study in both treatment groups when compared to placebo ($P < 0.001$). In addition, serum sodium was still significantly lower in the hibiscus group than in the placebo group 1 week after the end of the dosing ($P < 0.001$), though in the HCTZ group it returned to baseline levels. It should be noted that serum potassium was significantly lower in the hibiscus group than in the placebo group at baseline ($P < 0.001$). Serum chloride increased significantly with hibiscus treatment and decreased significantly with HCTZ treatment ($P < 0.001$ for both). HCTZ resulted in a significant increase in urine sodium, potassium, and chloride concentrations after 4 weeks ($P < 0.001$, $P < 0.001$, and $P < 0.01$, respectively). The hibiscus treatment resulted in a decrease in the urine concentration of potassium ions in weeks 2-5 ($P < 0.001$ for all). Again, it should be noted that urine concentrations of sodium, potassium, and chloride ions were lower in the hibiscus group than in the placebo group at baseline ($P < 0.01$, $P < 0.01$, and $P < 0.001$, respectively).

Hibiscus extract decreased SBP, DBP, and MAP to a greater extent than HCTZ in Nigerian patients with mild to moderate hypertension. HCTZ decreased serum concentrations of sodium, potassium, and chloride ions and increased urine concentrations of these ions. HCTZ is a diuretic, and these results are in keeping with the function of HCTZ. The patients in the hibiscus group had significantly lower baseline concentrations of serum potassium ions and urine sodium, potassium, and chloride ions than did patients in the placebo group. Because of this bias at baseline, it is difficult to draw conclusions about the effect of hibiscus on these electrolytes. Despite these discrepancies, the hibiscus treatment did reduce the serum concentration of sodium ions and the urinary concentration of potassium ions (a potassium-sparing effect), even a week after dosing stopped. Hibiscus does not affect serum and urine concentrations of dissolved ions in the same way as HCTZ. Evidence has shown that hibiscus may operate via many mechanisms and not only as a diuretic. Previous studies have shown that hibiscus appears to act as a vasodilator and diuretic, suppresses uptake of calcium ions, and inhibits angiotensin-converting enzyme. The study was limited by the small sample size, lack of description of blinding of the placebo and hibiscus groups, and the inability to blind the HCTZ group. The authors also recommend quantifying the types and concentrations of anthocyanins in the hibiscus extract.

—Cheryl McCutchan, PhD

Referenced article can be accessed at http://www.njcponline.com/article.asp?issn=1119-3077;year=2015;volume=18;issue=6;spage=762;epage=770;aulast=Nwachukwu.