

A Study on Effects of Combining Vitamin C with Hypertension Therapy

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Abstract

Objective:

Hypertension is a common condition with high mortality from associated diseases. Epidemiological evidence suggests that a deficiency of vitamin C may be a risk factor for hypertension. The objective was to conduct systematic review and analyze the effect of vitamin C supplementation as a supportive antihypertensive.

Methods:

A prospective observational study was done on about 70 out-patients, who were suffering from hypertension and fitted the study criteria in general medicine department of Princess Esra hospital. All the data required for the study was collected, reviewed and recorded. Subjects were prescribed with anti hypertensive drugs alone for 45 days and then the prescription was added with vitamin C supplements for next 45 days. Changes in blood-pressure readings were compared.

Results:

Initial average systolic blood pressure was observed to be 150.2 ± 10.2 mm Hg, the average systolic blood pressure with anti hypertensive as 142.2 ± 7.3 mmHg, the average systolic blood pressure with both anti-hypertensive's and vitamin C as 129.1 ± 10 mmHg. We observed the initial average diastolic blood pressure as 92.2 ± 7.2 mm Hg, the average diastolic blood pressure with anti - hypertensive as 89.3 ± 6.3 mmHg, the average diastolic blood pressure with both anti hypertensive and vitamin C as 84.5 ± 5.1 mmHg

Conclusion:

From observations, it was seen that combining vitamin C along with antihypertensive therapy had moderate blood pressure lowering effect and other health benefits to the study subjects.

Key words: *Hypertension, Vitamin C, Blood pressure.*

Introduction

Hypertension can lead to damaged organs, as well as several illnesses, such as renal failure (kidney failure), aneurysm, heart, stroke, or heart attack. Hypertension, also referred to as high blood pressure, is a condition in which the arteries have persistently elevated blood pressure. Every time the human heart beats, it pumps blood to the whole body through the arteries. Blood pressure is the force of blood pushing up against the blood vessel walls. The higher the pressure the harder the heart has to pump. Hypertension is defined as persistent elevation of systolic blood pressure (SBP) of 140mmHg or greater and diastolic blood pressure (DBP) of 90 mmHg or higher or taking anti-hypertensive medication. The Joint National

Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII) classifies normal blood pressure (BP) in adults as systolic BP < 120mmHg and diastolic BP < 80 mmHg. Pre-hypertension is defined as SBP from 120-130mmHg or DBP from 80-89 mmHg. Stage 1 hypertension (HTN) is SBP from 140-159 mmHg or DBP from 90-99 mmHg. Stage 2 hypertension is SBP of 160 mmHg or greater and DBP of 100 mmHg or greater. Diagnosis is based on average two or more properly measured seated blood-pressure readings taken at two or more office visits after the initial screening, and the higher BP value are selected to classify the individual's blood pressure stage¹.

Vitamin C role in blood pressure

Vitamin C supplementation effectively lowers blood pressure to help prevent stroke and heart disease. It is noted that the blood pressure lowering effect of vitamin C supplementation was likely due to the nutrient's biological and physiological effects. Vitamin C acts as a diuretic, causing the kidneys to remove more sodium and water from the body, which helps to relax the blood vessel walls, thereby lowering blood pressure.

Vitamin C is also known to improve essential endothelial function of delicate artery walls, effectively restoring elasticity and resolving micro-cracks in the vessels that lead to arterial plaque formation. Most nutrition experts recommend up to three grams of vitamin C supplementation per day for optimal protection from hypertension, cardiovascular disease and stroke.

Vitamin C as an antioxidant interferes with production of free oxygen radicals and peroxides and also stimulates the synthesis of prostaglandins such as prostacyclin, which have a vasodilator effect. Vitamin C induces the release of norepinephrine from adrenal glands, which reduces the plasma level of sodium. Vitamin C is more than an anti oxidant, and its effects on neurotransmitters may contribute to its anti hypertensive activity².

Vitamin C deficiency

Severe form of vitamin C deficiency is known as scurvy, which mainly affects older, malnourished adults. Others symptoms of deficiency include Anemia, Bleeding gums, reduced ability to fight infection, Decreased wound-healing rate, easy bruising, Gingivitis (inflammation of the gums), Nosebleeds; Rough dry scaly skin, Swollen and painful joints.

Side effects

Serious side effects from excess of vitamin C are very rare, because the body cannot store the vitamin. However, amounts greater than 2,000 mg/day are not recommended because such high doses can lead to stomach upset and diarrhea.

Besides its role as antioxidant, recent studies suggest that vitamin C and its metabolites are integrally related to hypertension and other cardio

metabolic risks such as hypertension, diabetes mellitus and hypercholesterolemia.

Few studies on correlation between hypertension and vitamin C were carried out. Pharmacologically vitamin C tends to decrease the hypertension, but few studies concluded supporting that point and few contrasting it. Further studies are required for confirmatory purpose. Therefore, aim of the study was to conduct the research on Indian population to evaluate the Vitamin C effect on hypertension whose results may help general practitioners in controlling the most prevailing disease, hypertension; which can lead to many chronic diseases.

Materials & Methods

Sources of data

The data was collected from anonymised primary care clinical records of 70 cases registered at any time in the past three months and recorded in case report form. The case report form includes data on patients' demographics, characteristics, symptoms, diagnoses, results of investigations, and prescribed drugs. And data was also collected through the patient interviews.

Study criteria

Inclusion criteria

Cases were all patients aged between 35 and 60 with a hypertensive disorder during the study period. Cases of both genders were considered who had no other systemic disease and were not on any other dietary supplements. Cases that are willing to give verbal informed consent for the study were included.

Exclusion criteria

Potential participants were excluded if they were pediatrics patients, Pregnant & lactating women.

Sample size

A hospital based prospective and observational study was conducted on 70 cases.

Methodology

Patient enrollment

A hospital based prospective study was conducted on outpatients of General medicine Department, who were diagnosed with hypertension as per guidelines.

Collection of data

A suitable data collection form was designed and used. Data was collected with respect to Patients demographic details including age, sex etc. We also extracted information on the History of present illness, diagnosis, family history. We assessed exposure to drugs on the basis of prescriptions on or before the index date. We assessed presence of Co-morbid conditions. Full prescription data were collected, including drug name, formulation, dose instructions, and date.

Statistical analyses

The normality of distributions was checked for all variables. Differences between groups during supplementation were tested using paired t-tests, and variables not normally distributed were compared. Data were expressed as mean and standard deviation (SD) unless otherwise noted, and statistical significance was considered as *P=0.05. All statistical analyses were computed using SPSS version 11 for Windows (SPSS Inc., Chicago, 2001).

Results

70 subjects were included in the study and were given only anti hypertensive therapy (Angiotensin converting enzyme inhibitors) for the initial 45 days and the blood pressure is recorded. After 45 days the same subjects were prescribed with vitamin C 500mg/day in addition to anti hypertensive therapy, again the blood pressure has been checked and recorded.

We observed the initial average systolic blood pressure as 150.2±10.2 mm Hg, the average systolic blood pressure with anti hypertensive as 142.2± 7.3mmHg, the average systolic blood pressure with both anti hypertensive drugs and vitamin C as 129.1 ±10 mmHg. Fig.no.1

We observed the initial average diastolic blood pressure as 92.2 ±7.2 mm Hg, the average diastolic blood pressure with anti hypertensive as 89.3 ± 6.3 mmHg, the average diastolic blood pressure with both anti hypertensive and vitamin C as 84.5 ±5.1mmHg. Fig.no.1

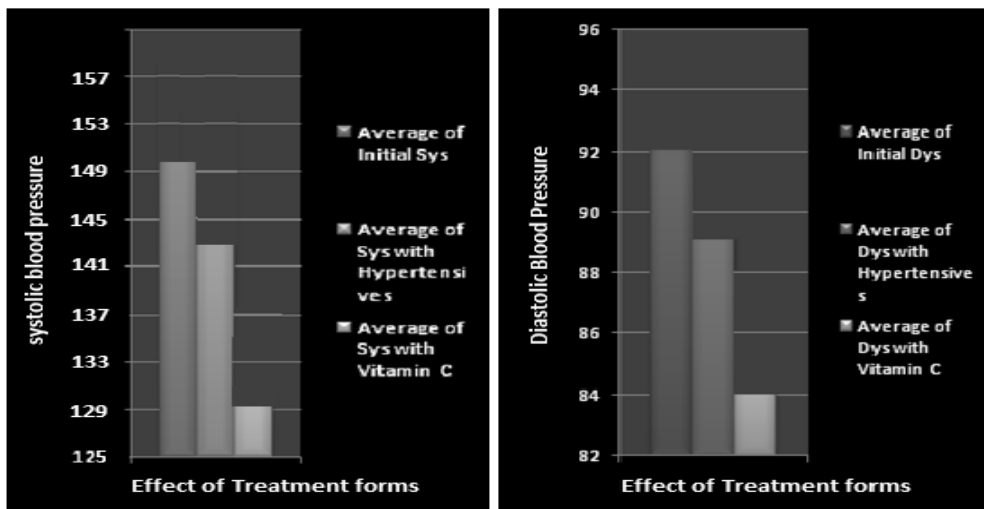


Figure 1: Effect of Anti-Hypertensive drugs (Angiotensin converting enzyme inhibitors) & Vitamin C on sample population (n=70).

By applying the paired t-test to know the comparative results between only anti hypertensive and both anti hypertensive and vitamin C, we get the values for the blood pressure as initial mean – 140.714, final mean – 133.485. Values of standard deviation: Initial- 15.515, final- 13.841. Values of standard error Initial- 1.854, final- 1.654. Keeping **P=0.05, we obtained the t-value as 2.909.

Thus, we observed there is a significant decline in both systolic blood pressure and diastolic blood pressure in individuals after 45 days of vitamin C supplementation as depicted in table 1.

Table 1: Effect of vitamin C supplementation on blood pressure (n=70).

Parameter	Treatment with anti-hypertensive drugs		Treatment with anti-hypertensive drugs along with Vitamin C	
	Before therapy (Average of 70 subjects)	After therapy (Average of 70 subjects)	Before therapy (Average of 70 subjects)	After therapy (Average of 70 subjects)
Systolic	150.2±10.2 mmHg	142.2 ± 7.3 mmHg	142.2 ± 7.3 mmHg	129.1 ±10 mmHg
Diastolic	92.2 ±7.2 mmHg	89.3 ± 6.3 mmHg	89.3 ± 6.3 mmHg	84.5 ±5.1mmHg

Discussion

The study was conducted to assess the effect of combining vitamin C with anti hypertension therapy. The lowering effect of hypertension by vitamin C was associated with a significant decline in both systolic and diastolic blood pressures, which may persist for a prolonged period³. Previous studies have reported association between higher vitamin C intake or status and lower BP⁴ and also inverse correlation between plasma ascorbate concentration and systolic and diastolic blood pressures⁵. Mayer Davis et al reported that vitamin C level was unrelated to cardiovascular risk factors in long term⁶ while Khaw et al reported a significant association between plasma vitamin C levels and long term sequels of hypertension⁷. Although high-dose vitamin C has also been shown to have anti-hypertensive effects⁸, in most of the studies, the dosage of vitamin C supplementation was no more than 500 mg per day. As a water-soluble vitamin, ascorbic acid is safe at conventional doses and in regard to its other beneficial effects as well as its potential in reducing blood pressure; long-term vitamin C supplementation may be a cost-effective adjunctive therapy for patients with high blood pressure.

Strength and limitations

Current study Combining vitamin C along with anti hypertensive therapy not only help in reducing blood pressure but also have other benefits like improving immunity, maintaining homeostasis, collagen synthesis, etc. Hence, improves overall health of the patient. Patient related limitations include Lack of awareness about the medical condition, Poor medication compliance, Inadequate understanding of the current health disorder and importance of therapy, Irregular follow ups. In summary, although, our study showed that vitamin C supplementation reduced blood pressure in hypertensive patients

because of the small sample size of this study, further studies employing larger population are warranted to confirm the results of present investigation.

Conclusion

This study indicates that Vitamin C has a moderate effect in lowering blood pressure when given along with anti-hypertensive drugs. In our study, the patients who were given vitamin along with anti-hypertensive therapy showed better results compared to those on just anti - hypertensive therapy. Vitamin C lowers both, systolic and diastolic blood pressure. As Vitamin C is a water-soluble vitamin and has no side effects as such it is even safe to prescribe. Therefore, our study "A Study on Effects of combining Vitamin C with hypertension therapy" shows that vitamin C along with antihypertensive therapy is much more effective in lowering blood pressure than antihypertensive drugs alone.

Conflict of interest No conflicts of interest have been declared.

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