



Effect of orally administrated cucumber (*Cucumis sativus* L.) and its beneficial effects on hypertensive patients

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Abstract

Hypertension is a major worldwide health problem and an increase in blood pressure causes stroke and heart diseases. The main objective of this study includes hypertension among people of the Thiruvarur District and evaluating the effectiveness of cucumber in the control of hypertension. A quantitative research approach was conducted with pre-test and post-test only design among the hypertensive clients aged between 31-50 years. A simple random sampling technique was used for sample selection. 100 grams of cucumber was administered once daily in the early morning for forty-five days. At the end of the sixth-week blood pressure was measured in both experimental groups using a sphygmomanometer by observing biological variables. Data were analyzed through descriptive (frequency, percentage, distribution, mean, standard deviation) and inferential statistical (independent, paired 't' test and chi-square test) methods. The study proves that cucumber is effective in controlling blood pressure levels more specifically diastolic blood pressure levels among hypertension patients and prevents them from developing complications. It is one of the cost-effective alternative sources of reducing blood pressure among hypertensive clients in the community.

Keywords: administrated cucumber, *Cucumis sativus* L, hypertensive patients

Introduction

According to the WHO, Blood pressure is the force exerted by circulating blood against the walls of the body's arteries, the major blood vessels in the body. Hypertension is when blood pressure is too high. Hypertension is a major risk factor, which is a silent killer and also a public health problem worldwide. It does not provide characteristic symptoms. But it can increase the incidence of strokes, heart attacks, chronic kidney disease, and even blindness if not controlled and controlled properly. (Prasetyaningrum Y, 2014) ^[10]. The statistical report indicated that nearly one billion adults had hypertension in 2000 and this is predicted to increase to one-fourth by 2025. Hypertension is a disorder of the blood vessels resulting in the supply of oxygen and nutrients carried by the blood being inhibited to tissues that need (Sustrani, et al., 2006) ^[6]. Medical guidelines defined hypertension as blood pressure higher than 140 over 90 mmHg. Chronical elevation of blood pressure is a condition of hypertension. According to the National Institutes of Health, blood pressure readings of 140/90 mm/Hg (Ghebretinsae. et al., 2007) ^[2] and higher on recurring measurements is considered hypertension (Hong et al., 2011). According to Basha, hypertension is a condition where a person experiences an increase in blood pressure above normal resulting in morbidity or mortality.

Hypertension is classified into types: primary (essential) and secondary hypertension. There is no specific cause for essential or primary hypertension and it is associated with various factors such as genetics, environment, diet, and lifestyle factors, including salt intake, stress, and lack of exercise. It is the risk factor for stroke, heart attack, heart failure, and arterial aneurysm. It is a major cause of the chronic renal disorder.

Secondary hypertension, which affects 5–10% of hypertensive individuals, is due to identifiable causes, such as diabetes and renal damage, and thus has a relatively higher chance of being treated. Oral contraceptives, the medicine used can also cause elevated blood pressure. On the other hand, essential hypertension is acquired by multiple factors such as diet, age, lifestyle, neuro-humoral activity, and interactions (Tabassum and Ahamad, 2011). Interestingly, the percentage of patients with essential hypertension (90–95%) far exceeds those with secondary hypertension (Tabassum and Ahamad, 2011).

Many Allopathic drugs are used as hypertensive drugs and they have undesirable side effects. The use of herbal medicine as a treatment modality has significantly increased over the last decade (Frishman et al., 2009). This is due to several factors, the principal of which is that herbal medicine is a cheaper alternative with fewer undesired side effects (Susalit et al., 2011). Cucumber is the edible fruit of the cucumber plant, *Cucumis sativus* which belongs to the family Curcubitaceae. The fruit is roughly cylindrical, elongated, with tapered ends which has a smooth, dark-green skin (Tindall, 1975). Cucumbers are mainly taken in the unripe green form (Doijode, 2001) ^[1]. Cucumber (*Cucumis sativus*) originated in India but was soon cultivated in different parts of the world. Research studies done in the experimental rabbits showed that cucumber is one of the edible plants with hypoglycemic activity and its anti-hyperglycemic effect significantly decreased the area under the glucose tolerance curve and the hyperglycemic peak (Grover, 2002) ^[2].

Simmons (1976) reported that cucumber (whole fruit) has about 96 percent water content which is the highest of any vegetable.

Materials and Methods

Study Area

The research was conducted at the peraiyur village in the Tiruvarur district. This area was selected as it was observed that there were many cases of Hypertension in a particular area. Cucumissativus (cucumber fruit) was purchased from the STET garden, Sundarakkottai, Mannargudi

Study population

One hundred hypertension patients in the middle age of 31 to 50 years were selected by the random sampling method for the study. Samples were selected to study and obtain information on age, gender, cigarette smoking, alcohol consumption, health status, and dietary pattern.

Anthropometry

The selected participants are subjected to anthropometric measurements like height, weight, body mass index, a waist-hip ratio of all 100 subjects was measured with necessary precaution.

Supplementation

The tender cucumber was used to treat hypertension by regulating the blood pressure level. The 100 g of fresh cucumber is supplemented daily on empty stomach in the early morning. The cucumber was consumed as a starter. A sample of Hypertension patients 90/140 mg/Hg were administered with 100g of fresh cucumber for 45 days. The blood pressure levels of the subjects were tested before and after supplementation were recorded.

Collection of data

A facet of the ace interview was conducted with an interview the help of the formulated interview schedule for the collection of necessary data.

Results and Discussion

Hypertension is a chronic disease in which the blood pressure in the arteries increases. For the rapid reduction of hypertension, blood pressure balancers should be used in the diet rather than highly morbid medicines. Medicinal herbs are one of the solutions. Based on the results obtained, hypertension can be treated in many ways including lifestyle changes or the use of herbal medicines Figure 1 indicates, that the selected Hypertension patients are in the age group of 31 -50 years old. The majority 29 % of subjects were in the age group of 46 – 50 years old, 26 % of subjects were in the age group of 41 –46 years old, 25 % of the subjects were age group of 31 –35years old and 20 % of subjects were in the age group of 36-40 years old. Hypertension usually develops after middle age adult maximum incidence is from the age of 31 to 50 years old compared to younger age people and therefore the prevalence of hypertension is higher in India. [Mishra, 2005].

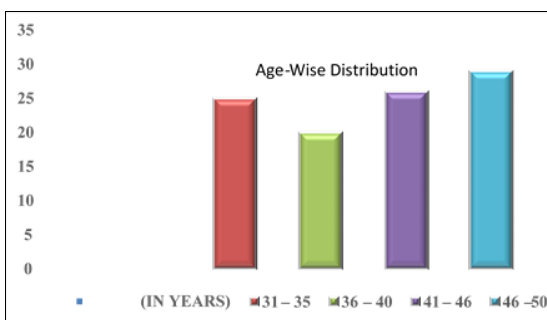


Fig 1: Age-Wise Distribution

The lifetime risk is the same for males and females, but men are more prone to hypertension at a younger age. Figure 2 indicates that the gender of the selected subjects. Here, 63 % of the subjects were in the male category and 37 % of the subjects are in the female category. The prevalence tends to be higher in older women. Men and women in their age of 40, 50, and 60 have a similar level of risk for developing high blood pressure [Pastar, 2003]

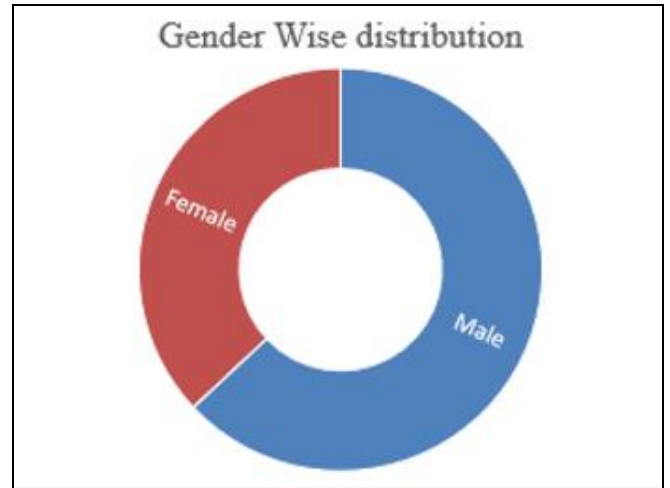


Fig 2: Gender Wise Distribution of the Subjects Lifestyle Pattern

Figure indicates that majority 76 % of the subjects do not have a habit of smoking and 24 % of the subjects had a habit of smoking. 7 % of the subjects were smoke 1 cigarette per day, 12 % of the subjects were smoke 2 cigarettes per day, 4 % of the subjects were smoke 3 cigarettes per day, and 1 % of the subjects were smoke more than 4 cigarettes per day. The nicotine is a major compound present in cigarette smoke is a big part of the problem. It raises the blood pressure and heart rate, narrows the arteries and hardens their walls, and makes the blood more likely to clot. It stresses the heart and sets up for a heart attack or stroke. [Jeong, 2013].

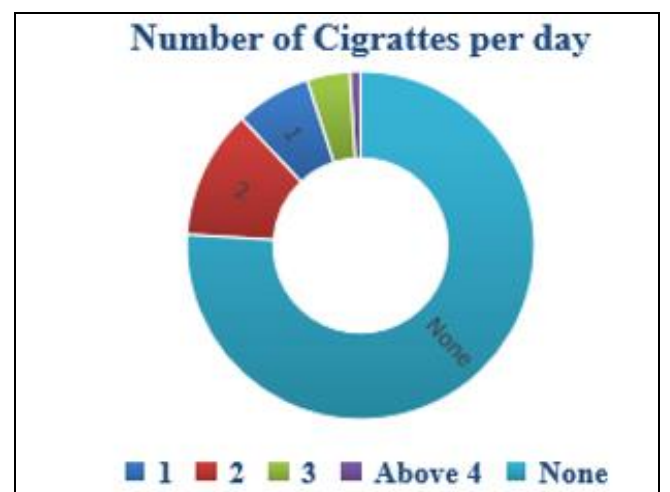


Fig 3: Number of Cigarette Smokers

Figure 4 indicates that majority of the subjects do not have the habit of alcohol consumption is 68 % and 32 % of the subjects have the habit of alcohol consumption, on that 12 % of the subjects were daily consume alcohol, 9 % of the subjects were weekly consume alcohol, 9 % of the subjects

were monthly consume alcohol and 2 % of the subjects were occasionally consume alcohol. Drinking too much alcohol can raise blood pressure to unhealthy levels. Having more than three drinks in one sitting temporarily increases the blood pressure, but repeated binge drinking can lead to long-term increases. Alcohol contains calories and may contribute to unwanted weight gain a risk factor for high blood pressure. Also, alcohol can interfere with the effectiveness and increase the side effects of some blood pressure medications. [Puddy, 2011]

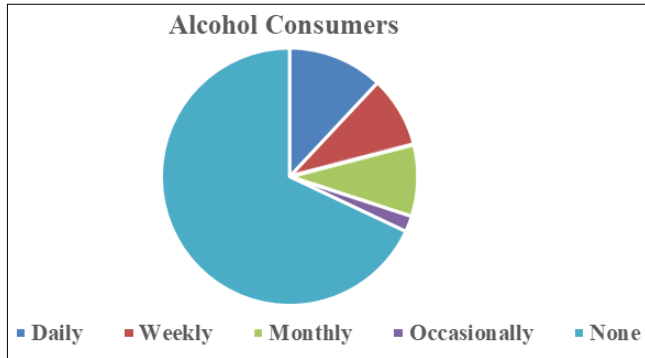


Fig 4: Alcohol consumption pattern

Health status

Figure 5 indicates that majority of the subjects had chest pain is 29 %, 18 % of the subjects had Dizziness, 17 % of the subjects had Headache, 12 % of the subjects had Shortness of breath, 12 % of the subjects had visual changes, 8 % of the subjects had the flushing and 4 % of the subjects had the Blood in the urine.

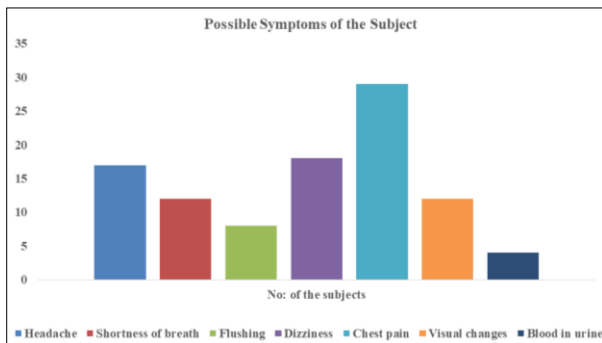


Fig 5: Possible Symptoms of the Subject

Dietary Pattern

A dietary survey is a scientific assessment of eating patterns that could detect nutrient deficiency. There are many methods to do dietary surveys. Five lifestyle-diet clusters were identified like Daily, weekly, monthly and occasionally higher age were related to one another and associated with a diet rich in cereals and cereal products, pulses and legumes, roots and tubers, green leafy vegetables, and other vegetables (Table VI). Perceptions of rural foods as healthy, coupled with key structural barriers such as food costs were identified. The food frequency questionnaire method helps in assessing meal patterns and dietary habits of people by identifying the number of times a specific food item is consumed in a defined period (Anyzewska et al., 2013).

TABLE-I shows that; 100 percent of subjects were consumed rice daily. 44 percent of the subjects were wheat consumed daily. Ragi, rice flakes, and other cereals are commonly consumed by the subjects. Eating breakfast cereal especially whole-grain cereal may reduce the risk of developing high blood pressure. [Adapon, 2001]. This table also indicated that, consumption pattern of the pulses by the subjects. Black gram dhal was consumed by the majority of the subjects daily, black gram dhal was used in the south Indian preparation- idly, dosa, red gram dhal was next commonly consumed dhal by the subjects daily, in the form of sambar, rasam, and poriyal. Bengal gram dhal and soybean dhal were common pulses consumed by the subjects.

Table I showed the consumption of greeny leaf vegetables and oil and sugar products. Curry leaves were consumed by majority 70 percent of the subject were consumed daily by all subjects inform of chutney or in the seasoning, drumstick leaves 36 percent of the subjects were consumed daily and amaranth leaves 14 percent of the subjects were consumed daily.

Fenugreek leaves and spinach were commonly consumed green leafy vegetables by the subjects. A green leafy delight, spinach is low in calories, high in fiber, and packed with heart-healthy nutrients like potassium, folate, and magnesium key ingredients for lowering and maintaining blood pressure levels. [Hedblad, 2011]

Table 1: Dietary pattern

S.No	Cereals	Daily	Weekly		Monthly	Occasionally	Never
			Once	Twice			
1.	Rice	100	-	-	-	-	-
2.	Ragi	-	26	19	34	11	10
3.	Rice flakes	-	32	18	31	19	-
4.	Wheat	44	18	26	12	-	-
5.	Others	-	-	25	22	16	19
Pulses & Legumes							
6.	Black gram dhal	65	-	35	-	-	-
7.	Bengal Gram dhal	-	29	8	30	27	6
8.	Red gram dhal	6	16	27	29	12	10
9.	Soybean dhal	4	10	9	12	13	48
Green leafy vegetables							
10.	Amaranth	14	-	30	30	28	-
11.	Curry leaves	70	26	4	-	-	-
12.	Drumstick leaves	36	16	34	10	-	4
13.	Fenugreek leaves	-	-	-	-	16	84
14.	Spinach	-	20	14	26	22	18
Oils and Sugar products							
15.	Coconut	30	37	16	15	2	-
16.	Groundnut	-	-	43	28	20	9
17.	Vanaspati	-	45	17	21	13	4
18.	Ghee	-	31	12	23	24	10
19.	Cooking oil	100	-	-	-	-	-
20.	Sugar	59	40	9	-	-	-
21.	Honey	-	-	-	18	25	57
22.	Jaggery	39	37	14	10	-	-

Plant sources of fats, such as avocados, nuts, olive oil, and omega oils, are a healthy diet. Saturated fats and trans fats, which are common in animal-source and processed foods, are bad for health. High cholesterol: More than 50 percent of all people with high blood pressure have high cholesterol. [Ross, 2012]

Anthropometry

Table 2: Mean Anthropometric Measure of the Subjects (N=20)

S. No	Anthropometric Measurements	Mean Value and Standard Value of the Selected Subjects	
		Before Supplementation	After Supplementation
1.	Height(cm)	174.88±9.55	174.88±9.55
2.	Weight(kg)	78.21 ±6.94	77.4±6.67
3.	Body mass index(BMI)	25.96 ±4.88	25.73±4.74

Above the table, II indicates that before supplementation of weight and height were measured with the mean height of the subjects to be 174.88±9.55, the mean weight of the subjects to be 78.21 ±6.94, and the mean Body mass index (BMI) of the subjects were found to be 25.96 ±4.88. After supplementation of the mean height of the subjects to be 174.88±9.55, mean weight of the subjects to be 77.4±6.67, and mean body mass index (BMI) of the subjects 25.73±4.74. The majority of the selected subjects were no change in height and weight is reduced in some subjects is 1or 2 kg. Being normal (BMI 18.5 – 25.4), overweight (BMI of 25-29.9), or affected by obesity (BMI 30-39.9) or severe obesity (BMI 40 or greater). Greatly increased risk of developing hypertension [Williamson, 2010]

Table 3: Mean Waist-Hip Ratio of the Subjects

S. No	Anthropometric Measurements	Mean And Standard Value of the Selected Subjects
1.	Waist	64±16.04
2.	Hip	80.17±7.5
3.	Ratio	0.81±0.15

The above table, III shows that the mean waist circumference of the subjects was found to be 64±16.04, the mean hip of the subjects found to be 80.17±7.5and the mean waist-hip ratio of the subjects found to be0.81± 0.15.

Table 4: Clinical Examination of the Subjects

S. No	Type of Test	Mean Value And Standard Value Of The Selected Subjects			
		Before Supplementation		After Supplementation	
1.	Blood pressure	Systolic	Diastolic	Systolic	Diastolic
		141±6.22	96±4.89	123.75±4.43	80.5±4.97

The above table shows that before supplementations of cucumber mean of systolic pressure was is141±6.22 and the diastolic pressure level of selected subjects was found to be 96 ± 4.89 and the mean of the subjects. After supplementation, mean systolic pressure is123.75±4.43 and diastolic pressure level 80.5±4.97 of selected subjects indicated the significant activity of cucumber.

Conclusion

From this research, it is concluded that although diet and medication are effective in reducing the blood pressure levels when intake of cucumber in appropriate quantity had an additional beneficial effect in reducing blood pressure levels and it does not induce any side effects after consumption.

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