

Cardamom as a blood pressure lowering natural food supplement in patients with grade one hypertension

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ABSTRACT

The present study assessed the role of cardamom fruit in lowering blood pressure in patients with grade 1 hypertension. The study were performed on 30 newly diagnosed subjects (25-55 years) of grade 1 primary hypertension (130-139/80-89 mm Hg) according to ACC/AHA guideline. For each participant, BP was measured 2 times using mercury sphygmomanometer with an appropriate-sized cuff following a standardized protocol. Administration of two capsules of cardamom three times daily for a total of 3g per day for 3 months resulted in significant decrease in systolic and diastolic blood pressure, $P < 0.05$. Despite the significant decrease in systolic blood pressure since the first 4 weeks of treatment and further decrease at the end of the 8 weeks, it did not return to the normal (< 130 mmHg) until the end of 12 weeks of treatment ($r = - 0.933$, $P < 0.01$). The diastolic blood pressure significantly decrease since the first 4 weeks of treatment, but also it did not return to the normal (< 80 mmHg) until after the end of 12 weeks of treatment ($r = - 0.939$, $P < 0.01$). Cardamom contains high number of constituents that have pharmacological properties via more than one mechanisms of action, it could be a natural surrogate for treatment of grade 1 hypertension.

Keywords: Cardamom, Natural food, Blood pressure, Grade 1, Hypertension

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INTRODUCTION

Hypertension is a common serious public health challenge worldwide as a result of highly prevalence tendency, in addition, it is considered as one of the major risk factors causing cardiovascular and renal diseases [1,2].

Hypertension defined as blood pressure $\geq 130/80$ mm Hg according to the guideline of American College of Cardiology (ACC)/American Heart Association (AHA) [3]. Hypertension is strongly correlated with high incidence of mortality because it is the most direct causative risk factor of cardiovascular disease (CVD) leading to stroke and ischemic heart disease [4]. Approximately 20 million die each year because of Cardiovascular disease (CVD), although the progression in disease management [5]. So, development of health awareness concerning knowledge of the disease, early diagnosis, and correct treatment is very important to reduce associated morbidity and mortality [1].

Cardamom, botanically known as (*Elettaria cardamom*), is a perennial, herbaceous rhizomatous monocot plant, from the family Zingiberaceae. This well-known spice that have been used as culinary ingredient considered herbal medicine that have been used in pharmaceutical applications [6]. Cardamom contains an essential oils and other bioactive compounds that represent an important sources of flavonoids, alkaloids, terpenoids, anthocyanins and phenolic compounds like, 1,8-cineole, terpinyl acetate, limonene, terpinolene and myrcene [7,8] these functional compounds have protective effect against CVD via lowering blood pressure [9].

MATERIALS AND METHODS

Formulation of the herbal drug

The cardamom fruits with their outer shell were gathered and grinded very well to get homogenous powder with fine particles so that, the powder can be placed in gelatinous capsules in which, each capsule will contain 0.5g of the powder.

Study design

All official approvals included: permissions were obtained from Merjan Teaching City specialist center and outpatient clinics; for this study to be performed. In addition, the patients were counseled. Before testing, they signed a written informed consent.

The study were performed on 30 newly diagnosed subjects (25-55 years) of grade 1 primary hypertension (130-139/80-89 mm Hg) according to ACC/AHA guideline [3]. Those patients were free of secondary hypertension, IHD, according to clinical feature, biochemical investigations, and imaging study. In addition, they are not yet on any anti-hypertensive medications chemicals or other related herbs at least till the study accomplished. Moreover, the patients selected who were not alcoholics, not smokers, and not on the program of weight reduction.

Each capsule have been filled with 0.5g of the medicinal herb cardamom, and the dose administered for each patient was two capsules three times daily for a total of 3g per day for 3 months.

Blood pressure measurement

For each participant, BP was measured 2 times using mercury sphygmomanometer with an appropriate-sized cuff following a standardized protocol. Before their first BP measurement, participants rested for 5 min in a seated position with both feet on the floor. More than one reading should be done, and each should be separated by at least 1 to 2 minutes. If two values in the same arm

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differ by more than 5 mmHg, subsequent readings should be taken until a reasonable average is achieved [10].

Statistical analysis

All statistical calculation were performed by the using of SPSS software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp. USA) and Microsoft Excel (2010, Microsoft Corp. USA). All the results were expressed as mean \pm SEM. A $p < 0.05$ was considered statistically significant. Paired-

Sample T Test was employed to evaluate the presence of significant lowering of measured parameters among studied group.

RESULTS AND DISCUSSIONS

Administration of one capsule of cardamom three times daily for a total of 3g per day for 3 months resulted in significant decrease in systolic and diastolic blood pressure, $P < 0.05$ as illustrated in Table (1).

Table (1). The effect of cardamom on systolic and diastolic blood pressure with time in patients have grade 1 hypertension. (n = 30)

Blood pressure mmHg	Mean \pm SEM			
	Initial	4 weeks	8 weeks	12 weeks
Systolic	137.77 \pm 0.26	136.96 \pm 0.24	130.8 \pm 0.2	125.3 \pm 0.26
Diastolic	88.2 \pm 0.175	87.4 \pm 0.26	81.7 \pm 0.215	77.46 \pm 0.2

Despite the significant decrease in systolic blood pressure since the first 4 weeks of treatment and further decrease at the end of the 8 weeks, it did not return to the normal (< 130 mmHg) until the end of 12 weeks of treatment ($r = -0.933$, $P < 0.01$) Figure (1). The diastolic blood pressure

significantly decrease since the first 4 weeks of treatment, but also it did not return to the normal (< 80 mmHg) until after the end of 12 weeks of treatment ($r = -0.939$, $P < 0.01$) Figure (2).

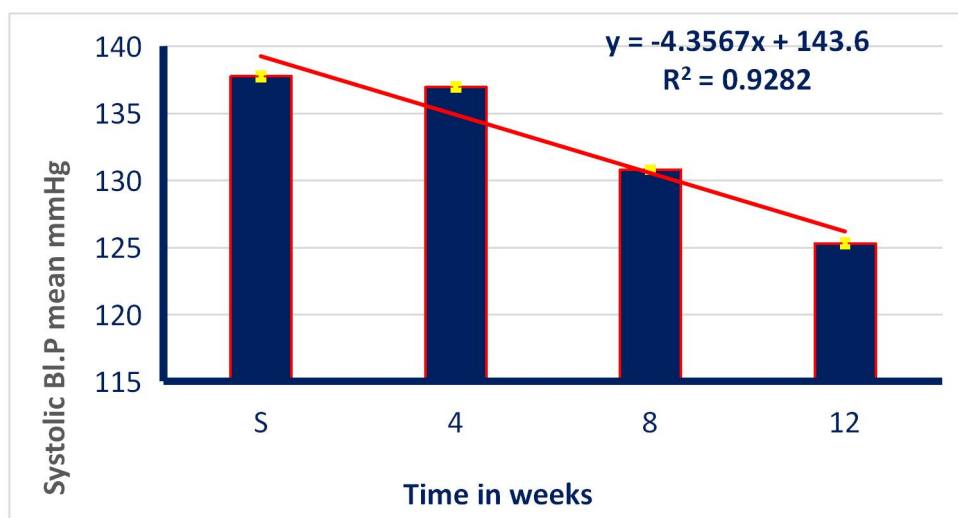


Figure (1). The mean \pm SEM of systolic blood pressure mmHg fall from the initial (with no treatment) through the 12 weeks of treatment.

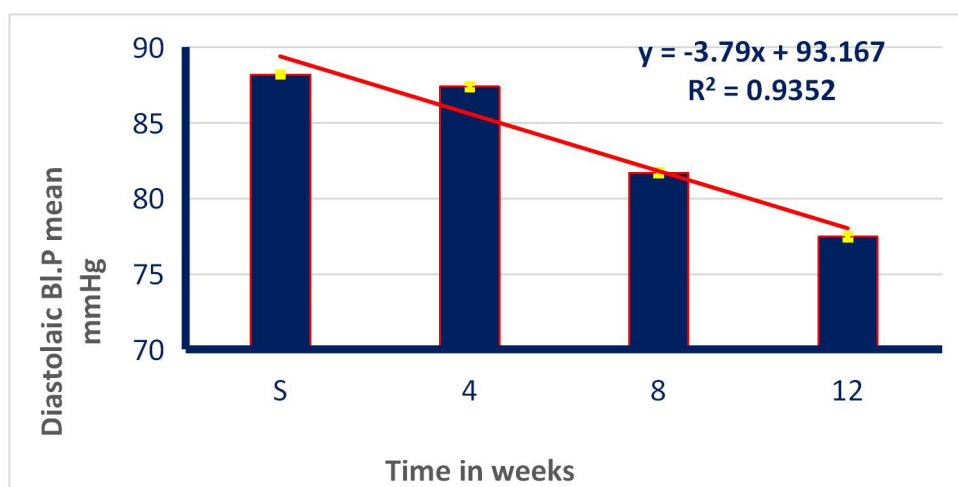


Figure (2). The mean \pm SEM of diastolic blood pressure mmHg fall from the initial (with no treatment) through the 12 weeks of treatment.

This decrease in blood pressure is very necessary to prevent or at least to reduce the risk of myocardial infarction and/or stroke because myocardial infarction and stroke which are both complications of hypertension, predominantly occur as a result thrombosis [11].

The phytochemical analysis outcomes displayed that cardamom contains alkaloids, flavonoids, sterols, saponins, and tannins. Cardamom contains many bioactive phytochemicals and other essential oils, among the major constituents are 1,8-cineole, terpinyl acetate, limonene, terpinolene and myrcene [12].

Many previous studies have confirmed the pharmacological properties that associated with cardamom due to the high content of bioactive compounds [13], especially its action in lowering blood pressure, this can be achieved by its role as:

1. Anti-oxidant

Oxidative stress can result in endothelial dysfunction and reduction in endothelium dependent vasodilation causing increase in peripheral vascular resistance as a result of lowering nitric oxide production. These structural changes can lead to hypertension.

Cardamom, reduce these structural alterations via its action as antioxidant and so, will lower hypertension [14, 15, 16].

2. Ca channel blocker

cardamom reduce the influx of Ca^{++} through calcium channels in cardiac muscle and to decrease aortic pressure. this ability of cardamom has been achieved directly by blocking the Ca - channel, and indirectly by inhibition the high K^{+} -induced contraction [17, 18, 19].

3. Cholinomimetic

Cardamom has cholinomimetic activity by its action on M3 receptor causing vasodilation and decrease peripheral resistance [20, 21].

4. Diuretic

The diuretic effect has been achieved by its action to increase urine volume in addition, enhancing K^{+} and Na^{+} excretion [22].

5. Sedative

Cardamom caused prolongation of pentobarbital-induced sleeping time in mice, similar to that observed with diazepam [23].

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