

## COMPARATIVE STUDY OF CINNAMON AND GARLIC ON DIFFERENT PARAMETERS IN RATS

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### ABSTRACT

*Garlic and Cinnamon are most commonly used as a flavoring agent in Asian countries. They both possess antioxidant activities, therefore, the current comparative study was conducted to evaluate the health related effects on renal, cholesterol and cardiac enzymes. For this purpose 12 Male Albino Wistar rats of male sex (200 – 250 g) purchased from ICCBS (International Center for Chemical and Biological Sciences) were taken for study and divided into 3 groups (n = 4). Group I = Untreated group; Group II = Cinnamon treated rats and received at a dose of 100 mg/kg b.w.; Group III = Garlic treated rats and received at a dose of 500 mg/kg b.w. for 13 consecutive days by intubation. Cinnamon treatment found to have increased plasma urea level ( $P < 0.05$ ), LDH (Lactate Dehydrogenase) ( $P < 0.05$ ) and CK (Creatine Kinase) level ( $P < 0.05$ ) while Garlic extract showed no significant changes when compared with control. Our results indicated that garlic and cinnamon extracts both participate in lowering the body weight but garlic subjected more beneficial healthy effects as compared to Cinnamon while Cinnamon extract need little bit attention.*

*Key Words: Cinnamon, Garlic, cholesterol, cardiac enzymes, lactate dehydrogenase, creatine kinase.*

### INTRODUCTION

Herbs and spices are being continuously used since ancient time as flavoring agent, food preservatives and remedies.<sup>1</sup> Spices are rich in antioxidants<sup>2</sup> and are potent inhibitors of tissue damage and inflammation caused by blood sugar and circulating lipids. Their phenolic contents are able to block the formation of compounds that contribute to damage caused by metabolic disorders.<sup>3</sup> Due to their bioactive compounds, relatively low costs, lower caloric contents and potential antioxidant activities, spices and herbs are commonly used as folklore medicines in Asia and Middle east.<sup>4</sup>

Garlic is believed to have flavoring agent, traditional medicine and a functional food to enhance physical and mental health. It acts as heart tonic and maintains the fluidity of blood and strengthens the heart and shows inversely proportional to cardiovascular disease and garlic consumption.<sup>5,6</sup> It is remedy for heart diseases, tumors and headaches. It has a unique organosulphur compound which provides its odor and flavor and biological activity. It contains high level of saponins and phenolic contents. The lipid soluble organo sulphur compound allicin showed antioxidant effects. It also shows antithrombotic activity, lower blood lipids, thus improves blood circulation and enhanced immunological responsiveness.<sup>7,8</sup>

Similarly, Cinnamon is medicinal plant and used widely from ancient time in Chinese, Ayurvedic, Tibb-Unani herbal medicines all over the world for the treatment of arthritis, rheumatism, sprains, muscular ar-

ches, pains, sore throats, cramps, constipation, indigestion, vomiting, hypertension, dementia, fever, infectious diseases and helminthiasis.<sup>9</sup> Gingerol is bioactive compound of ginger and has properties of vessels relaxants, stimulant of blood flow and relieve pain. Antimicrobial, anticancer and anti-inflammatory have also been shown. It is also helpful in Alzheimer's disease, hyperlipidemia and aortic atherosclerosis.<sup>10</sup>

Garlic and cinnamon intake is very common in Pakistan and Asian countries therefore, this study is designed to evaluate effects and side effects of Cinnamon and Garlic and their comparison on renal functions include; urea and creatinine in plasma, cardiac enzymes include; LDH, CK and cholesterol level in healthy rat model.

### MATERIALS AND METHODS

12 Male Albino Wistar rats of weight 200 – 250 gm were purchased from ICCBS for study. Animals were acclimatized to the laboratory conditions one week before the start of experiment and caged in a quiet temperature controlled room ( $24 \pm 4^\circ\text{C}$ ). Rats had free access to water and standard rat diet. The experiments were conducted in accordance with ethical guidelines for investigations in laboratory animals (Health research extension Act of 1985).

12 Albino rats were divided into 3 groups each contain 4 rats (n = 4).

*Group I:* Control group and received standard rat diet and water.

**Group II:** Cinnamon treated group and received cinnamon extract at a dose of 100 mg/kg b.w. orally for 13 consecutive days.

**Group III:** Garlic treated group and received garlic extract at a dose of 500 mg/kg b.w. orally for 13 consecutive days.

All the rats were weight at the start of experiment by using digital balance. Treated rats were weight before the intubation.

### Drug preparation and Administration Schedule

**Preparation of cinnamon extract:** 0.2 gm of cinnamon was weighed and dissolve in 5 mL of deionized water, mixed thoroughly and boiled for 5 minutes, cooled at room temperature. This suspension is used for final sample.

### Preparation of Garlic Extract

1 gm of garlic powder was weighed and dissolved in 5 mL of deionized water, mixed thoroughly and boiled for 5 minutes, cooled at room temperature. This suspension is used for final sample.

### Sample Collection

After 24 hrs of last dose of cinnamon and garlic, the animals were decapitated and blood sample were collected from head to wound in the lithium heparinized tube. The blood was centrifuged at 2000 rpm for 10 minutes and the separated plasma was stored in eppendorf tubes at 4°C till analysis.

### ANALYTICAL METHODS

#### Preparation of Protein Free Filtrate:

3 ml of water mixed well with 0.1 ml of plasma, 0.3 ml of 10% of sodium tungstate, 0.3 ml of 2/3 N sulfuric acid and centrifuge for 10 minutes at 1000 rpm. Store supernatant for urea and creatinine estimation.

#### Estimation of Renal Function Test

#### Estimation of Urea (Mather and Roland 1969)<sup>11</sup>

The urea is estimated spectrophotometrically using diacetyl monoxime method. 0.5 ml of pff was taken in clean glass test tube and mixed with 0.2 ml of diacetyl monoxime (140 mmol/L), 0.8 ml of mixture of sulfuric and phosphoric acid. Boiled tube for 30 minutes and record absorbance at 480 nm on Shimadzu – spectrophotometer UV 120 – 01. The calibration curve was prepared by using a series of standard solutions from main calibrating solution (2 mmol/L).

#### Estimation of Plasma Creatinine by Modified Jaffe's Method (Spietro et al, 1979)<sup>12</sup>

To 1.5 ml of protein free filtrate add 0.25 ml of NaOH and 0.75 ml of picric acid and allow standing for 15 minutes at room temperature. The absorbance was recorded at 530 nm on Shimadzu – spectrophotome-

ter UV 120 – 01. The calibration curve was prepared by using a series of standard solution from main calibrating solution (250 µ ml).

#### Estimation of Cardiac Enzymes

Plasma LDH (Lactate dehydrogenase) and CK (Creatine Kinase) activity was estimated commercially available Randox kit method.

#### Estimation of Cholesterol (Zlatkis 1953)<sup>13</sup>

To 0.1 ml of plasma sample add 5 ml FeCl<sub>3</sub>: CH<sub>3</sub>COOH, 3 ml of conc. H<sub>2</sub>SO<sub>4</sub> and read at 520 nm on Shimadzu – spectrophotometer UV 120 – 01. Calibration curve was prepared by using a series of standard solution from main calibrating solution (0.1 mg/ml).

#### Statistical Analysis

Results are presented as mean ± SD. Statistical significance and difference from control and test values were evaluated by Student's t-test. P-values of P < 0.05 were considered significant. Significant difference between control with garlic treated rats by t-test represented by \*P < 0.05. Significant difference between Control with Cinnamon treated rats by t-test represented by +P < 0.05.

### RESULTS

#### Effect on Plasma Urea and Creatinine Level in Control, Cinnamon, Garlic – Treated Rats

Increased urea level is observed in Cinnamon treated rats (\*P < 0.05). No significant results were observed in garlic – treated rats. Both cinnamon and garlic – treated rats showed no significant results in plasma creatinine level.

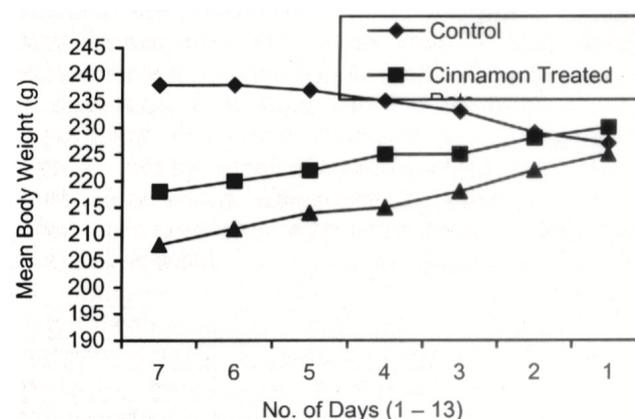


Figure 1: Effect on body weight in Control, Cinnamon and Garlic – treated rats:

#### Effect on Plasma LDH (Lactate Dehydrogenase) and CK (Creatinine Kinase) in Control, Cinnamon and Garlic – Treated Rats

Cinnamon – treated rats showed significant increased

level of cardiac enzymes LDH and CK (\*P < 0.05) while no significant results were observed in garlic – treated rats.

### Effect on Plasma Cholesterol Level in Control, Cinnamon and Garlic – Treated Rats

Both Cinnamon and Garlic – treated rats showed no significant results on plasma cholesterol level.

### Effect on Body Weight in Cinnamon and Garlic Treated Rats

Figure 1 showed the decreased mean body weight in Cinnamon and garlic treated rats when compared to control however; Garlic treated group showed more declined than Cinnamon treated rats.

### DISCUSSION

The effect of cinnamon on urea and creatinine level is shown in table 1. A significant increased of plasma urea level was observed when compared to control while no changes was observed in creatinine level. Similar result was shown previously by Khan A, et al, 2003.<sup>14</sup>

High urea level indicates kidney dysfunction, but it values varies with protein intake, liver metabolic capacity and renal perfusion so it gives poor indicator of renal function test, however, creatinine shows the excretion of waste products through urine.<sup>15</sup>

While garlic treated group showed no significant result in urea and creatinine level. Abdulkadir Abubakar et al, in 2004<sup>16</sup> reported no significant effect on urea level on 7 days garlic extract treatment. The use of fresh garlic has no significant effect on blood urea and creatinine level indicates that garlic can be helpful in maintaining the normal renal function.

Cinnamon showed significant increased level of cardiac enzymes LDH, CPK (Table 2) for 13 days oral treatment by intubation. It is found previously that cardiac enzymes present in blood at low level and their increased level may show some injury in muscle cells<sup>17</sup> (Gae et al, 2013). We found elevated 20.9% of LDH and 25% of CK level when compared with control may be due to cinnamon activate cardiac enzyme activities, otherwise; cinnamon intake should be taken cautionary.

Similarly, garlic showed non-significant effect on cardiac enzymes (Table 2). Cardiac enzymes has been a diagnostic tool in several clinical conditions such as myocardial infarction, hemolysis malignancy and hepatic disease. Our results indicated that garlic supple-

Table 1: *Effect on Urea and Creatinine level in Control, Cinnamon and Garlic – treated rats:*

Parameters	Control	Cinnamon Treated	Garlic Treated
Urea (mg/dL)	28.82 ± 1.76	40.71 ± 5.43*	24.60 ± 3.75
Creatinine (mg/dL)	0.43 ± 0.039	0.47 ± 0.021	0.45 ± 0.4

Table 2: *Effect on plasma cardiac enzymes in Control, Cinnamon and Garlic – treated rats:*

Parameters	Control	Cinnamon Treated	Garlic Treated
LDH (U/I)	493.7 ± 10.2	596 ± 48.5*	544.4 ± 40.8
CK (U/I)	258.8 ± 35.60	324 ± 24.4*	268.8 ± 20.13

Table 3: *Effect on plasma Cholesterol in Control, Cinnamon and Garlic – treated rats:*

Parameters	Control	Cinnamon Treated	Garlic Treated
Cholesterol (mg/dL)	23.99 ± 3.64	24.43 ± 4.73	25.32 ± 2.33

Values are mean ± SE

Significant differences between Control and Cinnamon and Garlic – treated rats by T<sub>2</sub> – Test, \*P < 0.05 is considered to be significant

mentation keeps the cardiac enzymes normal and keep helps in maintaining the cardiac muscles tone and enzymes activity (Amal et al, 2012).<sup>18</sup>

Table 3 showed no significant effect of Cinnamon on cholesterol level. It is found that Cinnamon had essentials compounds including cinnamonaldehyde, fibre, calcium, magnesium and iron. Calcium and fiber binds to bile salts and thus help in removing from body. Which is preventive for colon cancer. This removing of bile, enhance the breakdown of cholesterol to make new bile, this process help to lower high cholesterol level<sup>19</sup> (Jayaparakasha et al 2009). Cinnamon is therefore helpful in preventing atherosclerosis, and cardiovascular diseases and hypercholesterolemia. Similarly, garlic extract showed no significant effect on cholesterol level. Stephanie et al, in 2003,<sup>20</sup> found that garlic extract lower the triglyceride levels and cholesterol in diabetic rats. It is suggested that garlic contain some constituents including water soluble S-allylcysteine and fat soluble diallyl sulfide which helps in inhibiting the squalene monooxygenase and HMG – Co A reductase enzyme activities involved in cholesterol biosynthesis (Augusti et al, 2005, Cheng et al, 2013).<sup>21,22</sup>

The finding of this study reveals that alone treatment of Cinnamon significantly enhanced the level of urea and cardiac enzyme while Alone treatment of garlic shows no significant results. It is suggested from

this study that both antioxidants could be subjected healthy effects. Alone garlic is considered to be more helpful in maintaining the body cholesterol, cardiac enzymes and urea, creatinine level as compared to alone Cinnamon extract; therefore Cinnamon extract should be used with care and attention.

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