

## Effect of repeated administration of cinnamon aqueous extract on body weight, glucose levels and lipid profile on over weight rats

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**Abstract:** Plants are the source of both traditional and medicinal plant for curing and treatment of diseases in recent year. Plant extracts containing several active constituents which often work together synergistically. The study was designed to investigate the effect CNAE on lipid profile and glucose level in overweight albino wistar rats. Animal were divided into two group 1 receive CNAE and 2 receive equal volume of tap water. Extract were given daily once a day at the dose of 2ml/animal. After the 17 %of reduction of weight treatment were terminated and blood sample were collected for biochemical estimation. The result show significant decrease in body weight, total Cholesterol, Triglycerides, Low density lipoprotein cholesterol and significant increase in high y density lipoprotein while non-significant effect were observed in electrolyte levels. The data of present research demonstrated that CNAE not only possess hypoglycemic and hypolipidemic properties as well as it could be used for reduction body weight.

**Keywords:** Total cholesterol, Cinnamon bark aqueous extract (CNAE), HDL-C, LDL-C, T.G.

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### INTRODUCTION

According to WHO diabetes mellitus divided into four categories, insulin depended diabetics mellitus (IDDM) results from cellular mediated autoimmune destruction of  $\beta$ -cell of islet of langerhans. Specific types and gestational diabetes<sup>1-2</sup>, non-insulin dependent diabetes mellitus (NIDDM) also termed as adults onset diabetes due to insulin resistance and affected individual caring insulin deficiency<sup>3</sup>.

Total cholesterol is the major parameter for cardio vascular diseases (CVD) in hypertensive patients<sup>4</sup>. Several study reported that increase levels of total cholesterol, LDL-C increase cardio vascular disease in diabetes and non-diabetes patient. Disorder of lipid metabolism usually identified by low levels of HDL-C and High levels of LDL-C in diabetes patients<sup>5-6</sup>. Many drugs available in market have lipid lowering effect but mode of action not clear yet. (11-15) these herb might be acting by inhibiting the activity HMG.CO.A reductase enzyme<sup>7-10</sup>.

Obesity and over weight is a major risk factor for cardiovascular diseases, hypertension, obstructive sleep apnea, osteoarthritis and certain types of cancer. An obese or overweight person has short life expectancy<sup>11</sup>.

A number of spices and herbs are traditionally used to cure health. Cinnamon is a traditionally use in Korea, China and Russia for maintenances of glucose level<sup>12-13</sup> and lipid<sup>14</sup>. This research protocol designed to investigate the effect of CNAE on glucose and total cholesterol, high density lipoprotein. Low density lipoprotein, Triglycerides and body weight.

### MATERIALS AND METHODS

#### Preparation of extract

Cinnamon bark purchased from local market. Identification was provided by experienced Botanist from the scientific institute Agriculture Department of Karachi University. The 50gm seeds were crushed in blender. The powder was soaked in 200 ml of water and leave for 24 hour at 4°C. The mixture was filtered and the filtrate was stored until ready to use.

#### Experimental protocol

Pakistan bred albino Wistar male rats whose weight was between 280-320gm. All animals were placed in single cages under 12 h light-dark cycle and control room temperature (23±2°C) with free access to specially prepared diet and normal water for one week, prior to starting the experiment so that rats could adopt themselves to new conditions.

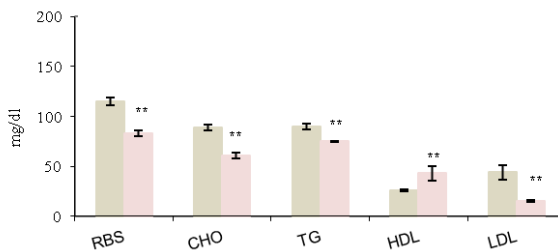
The test group received 2ml Cinnamon bark aqueous extract. 2ml extract contain eight grams of cinnamon bark. The control group received normal water equivalent to that of aqueous extract of herb. Body weight was monitored weekly. Rats were decapitated, when 15-19% body weight reduction was observed in herbs treated rats using guillotine. Blood samples were obtained and preserved at -70°C for biochemical estimations. Untreated rats were also decapitated at the same time.

#### Statistical analysis

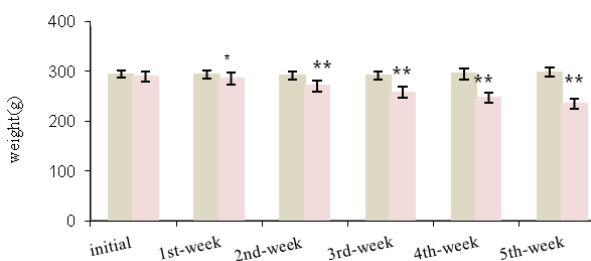
The significance differences between the mean of the treated and untreated groups were analyzed by student's *t*-test. Values of  $p < 0.05$  were considered as significant. Data expressed in figures as mean ± standard deviation (SD).

## RESULTS

Figure 1 shows the significant decrease ( $p < 0.01$ ) in cholesterol, triglycerides, LDL-cholesterol, and a significant increase ( $p < 0.01$ ) in HDL-cholesterol. Figure 2 show significant decrease ( $p < 0.01$ ) in body weight as compared to control.



**Figure 1:** Effect of repeated administration of CNAE on serum lipid profile and glucose level of rats. Values are mean $\pm$ SD (n=12) significant difference by Student *t*-test \*\* $p < 0.01$  from respective controls.



**Figure 2:** Effect of repeated administration of CNAE on body weight of rats. Values are mean $\pm$ SD (n=12) significant difference by Student *t*-test \*\* $p < 0.01$  and \* $p < 0.05$  from respective controls.

## DISCUSSION

More than 400 plant have been identified with the hypoglycemic potential<sup>15</sup> the various constituent of herb responsible for their hypoglycemic and hypolipidemic effect. Present study show decrease in glucose level in treated rats.

Several researchers demonstrated that MHCP (methyl hydroxyl chalcone polymer) is active constituent of Cinnamon have insulin mimetic properties<sup>16</sup>. Various mechanisms have been reported for hypoglycemic properties of cinnamon.

Cinnamon could enhance glucose uptake enhancing the receptor Kinase activity, autophosphorylation of insulin receptor and glycogen synthase activity<sup>17-19,14</sup>. Jarvull et al., 2001 reported the cinnamon increase glucose uptake in adipocytes<sup>18</sup>.

Present study also shows significant decrease in TG, TC, and LDL-C while increase in HDL-C in treated rats as compare to control. CNAE may improve lipid profile by inhibiting HMG-CoA

reductase involves in cholesterol syntheses<sup>21-22</sup>. Qin et al., 2003 reported cinnamon exhibits lipid lowering affect by lipase activity. Present study also show significant reduction in weight of rat's. It could be possibly related to inhibition of lipogenesis and increase the rate of lipolysis.

## CONCLUSION

These finding provide evidence the CNAE exert not only hypoglycemic and hypolipidemic effect as well as weight reducing properties.

## REFERENCES

1. Atkinson, M.A. and Maclaren, N.K. The Pathogenesis of insulin dependent diabetes. *N. Engl. J. Med.* 1994, 331: 1428-1436.
2. Takahashi, J.A., Pereira, C.R., Pimenta, L.P., Boaventura, M.A. and Silva, L.G. Antibacterial activity of eight Brazilian Annonaceae plants. *Nat. Prod. Res.* 2006, 20: 21-26.
3. De Fronzo, R.A., Bonadonna, R.C. and Ferrannini, E. Pathogenesis of NIDDM, International Text book of Diabetes mellitus. 2nd ed. Chichester, John Wiley, England. 1997, 635-712.
4. Haffner SM, Lehto S, Ronnema T, Pyorala K, Laakso M: Mortality from coronary heart disease in subjects with type 2 diabetes and in non-diabetic subjects with and without prior myocardial infarction. *N Engl. J. Med.* 1998, 339:229-234.
5. Kannel WB, Castelli WP, Gordon T: Cholesterol in the prediction of atherosclerotic disease. New perspectives based on the Framingham study. *Ann Intern Med* 1979, 90:85-91.
6. Homma Y: Predictors of atherosclerosis. *J Atheroscler Thromb.* 2004, 11. J: 265-270.
7. Satyanarayan, U. Metabolism of lipid Textbook of Biochemistry, 3rd ed. Books and allied pvt. Ltd., 2006, p. 309-312.
8. Shachaf, C. M., Perez, O. D., Youssef, S., Fan, A. C., Elchuri, S., Goldstein, M. J., Shirer, A. E., Sharpe, O., Chen, J., Mitchell, D. J., Chang, M., Nolan, G. P., Steinman, L. & Felsher, D.W. Inhibition of HMG CoA reductase by atorvastatin prevents and reverses MYC induced lymphomagenesis. *Blood*, 2007, 110(7): 2674-2684.
9. Ray, K. K. & Cannon, C. P. The Potential Relevance of the Multiple Lipid-Independent (Pleiotropic) Effects of Statins in the Management of Acute Coronary Syndromes. *Journal of American college of Cardiology.* 2005, 46 (8): 1425-1433.
10. Zuraini, A., Aziah, M. R., Arifah, A. K., Sulaiman, M. R. & Somchit, M. N. Aqueous Extract of *Andrographis paniculata* improve Lipid profile of rats Fed with High cholesterol diet, *journal of Indian Medicin.* 2006, 2(1): 45-49.
11. Haslam DW and James W P. Obesity. *Lancet*, 2005, 366 (9492): 1197-209.
12. Bailey C.J. and Day C. Traditional plant medicines as treatments for diabetes Care. 1989, 12: pp. 553-564
13. Chung T.H. Korean Flora (Herb Part) (1994) p. 283
14. Qin B, Nagasaki M, Ren M, Bajotto G, Oshida Y, and Sato Y: Cinnamon extract (traditional herb) potentiates in vivo insulin-regulated glucose utilization via enhanced insulin signaling in rats. *Diabetes Res Clin Pract.*, 2003, 62:139-148.
15. Ernst E. Plant with hypoglycemic activity in humans. *Phytotherapy*, 4; 73-78.

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16. Karall J, Jarvill-Taylor, Ph.D., et. al., A Hydroxychalcone Derived from Cinnamon Functions as a Mimetic for Insulin in 3T3-L1 Adipocytes, *Journal of the American College of Nutrition*, 2001, 20(4).
17. Imparl-Radosevich J, Deas S, Polansky MM, Baedke DA, Ingebritsen TS, Anderson RA, Graves DJ: Regulation of PTP-1 and insulin receptor kinase by fractions from cinnamon: implications for cinnamon regulation of insulin signaling. *Hom Res.*, 1998, 50:177-182.
18. Jarvill-Taylor KJ, Anderson RA, and Graves DJ: A hydroxychalcone derivative from cinnamon functions as a mimetic for insulin in 3T3-L1 adipocytes. *J Am Coll Nutr.*, 2001, 20:327-336.
19. Cao H, Polansky MM, and Anderson RA: Cinnamon extract and polyphenols affect the expression of tristetraprolin, insulin receptor, and glucose transporter 4 in mouse 3T3-L1 adipocytes. *Arch Biochem Biophys.*, 2007, 459:214-222.
20. Lee K, Nichols J and Smith A. Identification of a developmentally regulated protein tyrosine phosphatase in embryonic stem cells that is a marker of pluripotential epiblast and early mesoderm. *Mech Dev.*, 1996, 59(2): 153-164.
21. Kannappan S, Jayaraman T, Rajasekar R, Ravichandran MK and Anuradha CV. Cinnamon bark extract improves glucose metabolism and lipid profile in the fructose-fed rat. *Singapore Med J.*, 2006, 47: 858-863.