

## **Antihyperglycaemic And Antihyperlipidemic Effects Of Ethanollic Extract Of *Syzygium Aromaticum*(Clove) In Streptozotocin Induced Diabetic Rats**

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Diabetes mellitus (DM) is a syndrome characterized by chronic hyperglycaemia and relative insulin deficiency, resistance or both. Diabetes mellitus is not a single disease but basically a group of disorders which are characterized by hyperglycaemia, hyperlipidaemia, glycosuria and ketonaemia<sup>1</sup>. *Syzygium aromaticum* is the aromatic dried flower buds of a tree in the family Myrtaceae. *Syzygium aromaticum*, usually called clove, is used as a topical antiseptic and local anaesthetic in dentistry. The purpose of the present study was to assess the effect of an ethanollic extract of *Syzygium aromaticum* buds in streptozotocin (STZ) induced diabetes in rats.

Sixty adult male Wistar rats weighing 200-250g were used in this study. The care and handling of rats were in accordance with the internationally accepted standard guidelines for use of experimental animals. Ethanollic extract was prepared by the method described by Tajuddin et al<sup>2</sup>. High performance liquid chromatography analysis of ethanollic extract showed presence of eugenol, isoeugenol, caryophyllene, polyphenols, flavonoids, kaempferol, and terpenoids. Single injection of STZ was given intraperitoneally and rats showing a fasting glucose level >280mg/dl were included in the study. After induction of diabetes all rats were divided into, normal control group (A), diabetic control group (B), and the two groups (C and D) serving as experimental groups while group E served as an active control receiving glibenclamide. Group C and D diabetic experimental rats received an ethanollic extract of *Syzygium aromaticum* at 250 mg/kg and 500mg/kg of body weight orally for eight weeks on a daily basis. Group E rats received glibenclamide at 0.5 mg/kg body weight orally for eight weeks. Blood samples were collected after eight weeks. Serum glucose, total cholesterol, serum triglycerides, high density lipoprotein (HDL) and low density lipoprotein (LDL) levels were estimated using commercially available kit (Randox, UK). The data were entered and analysed using SPSS 17.0 (Statistical Package for Social Sciences). All data are shown as mean  $\pm$  S.E.M (standard error of mean). One-way ANOVA (analysis of variance) was applied to observe group mean differences. A p-value of <0.05 was considered as statistically significant.

The present study showed a significant ( $p < 0.01$ ) elevation in the levels of serum glucose (298 $\pm$ 2 vs. 131 $\pm$ 5), triglycerides (177 $\pm$ 5 vs. 65 $\pm$ 5), LDL (151 $\pm$ 6 vs. 39 $\pm$ 2) and total cholesterol (209 $\pm$ 8 vs. 119 $\pm$ 8) in group B diabetic rats as compared to group A normal rats. Serum HDL levels (15 $\pm$ 1 vs. 32 $\pm$ 2) was significantly ( $p < 0.01$ ) reduced in group B rats as compared to group A rats. Administration of *Syzygium aromaticum* ethanollic extract to group C [glucose (200 $\pm$ 6 vs. 298 $\pm$ 2), triglycerides (153 $\pm$ 6 vs.177 $\pm$ 5), LDL (130 $\pm$ 5 vs. 151 $\pm$ 6) and total cholesterol (181 $\pm$ 4 vs. 209 $\pm$ 8)] and D (149 $\pm$ 5, 118 $\pm$ 5, 103 $\pm$ 4, 161 $\pm$ 4) and glibenclamide to group E (210 $\pm$ 5, 158 $\pm$ 4, 138 $\pm$ 4, 184 $\pm$ 4) significantly( $p < 0.01$ ) brought the levels of these diagnostic parameters towards normal as compared to group B rats. When we compare mean values of parameters in group C, D and E with group B, although all decrease glucose and lipid levels, group D significantly reduced the levels as compared to group C and E. When we

compare mean values of group C and D with group E, although glibenclamide decrease glucose and lipid levels, *Syzygium aromaticum* ethanolic extract reduced the levels more. *Syzygium aromaticum* also significantly ( $p < 0.01$ ) increased the level of HDL more in group C ( $24 \pm 1$ ) and D ( $34 \pm 1$ ) than in group B ( $15 \pm 1$ ) and E ( $25 \pm 1$ ) showing greater effectiveness of *Syzygium aromaticum* ethanolic extract than glibenclamide.

The proposed mechanism of *Syzygium aromaticum* in reducing the glucose and lipid levels could be due to an antioxidant mechanism. Although we did not examine the effect of constituents of our extract separately, our results are in accordance with the reports by others who used chemical antioxidants and diets containing natural antioxidant plants. Robards and Antolovich have critically reviewed the analytical chemistry of flavonoids and it was found that flavonoids possess antioxidant activity<sup>3</sup>, which might have a role here. Further experiments on *Syzygium aromaticum* extract are needed.

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- (3) Robards K, Antolovich M. Analytical chemistry of fruit bioflavonoid. *A review. Analyst* 1997; 122:11-30