Extract of Gmelina arborea attenuates the oxidative stress in STZ induced diabetic rats

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Extract of *Gmelina arborea* attenuates the oxidative stress in STZ induced diabetic rats

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Medicinal plants have long been considered as valuable sources of medicine for treating variety of diseases and ailments. The therapeutic potential of medicinal plants is often attributed to their antioxidant properties.[1] Further, herbal medicines are believed to have preventive effects on chronic diseases due to their antioxidant properties.[2] They are claimed to reduce the cellular damage caused by reactive free radical species which is currently suggested as one mechanism underlying diabetes and its complications.[3] As in many diseases including diabetes, biomarkers of oxidative stress are elevated in the liver at an early stage. Thus, the effect of a claimed antidiabetic agent on the antioxidant status of hepatic tissue of diabetic rats has been widely studied and is a recognized approach for the determination of possible *in vivo* antioxidant potential. *Gmelina arborea* (Et-demata, Family: Verbenaceae) has been widely used in traditional medicine for the treatment of diabetes mellitus in Sri Lanka. The *in vivo* acute antihyperglycaemic effect of aqueous leaf extract of *G. arborea* has been scientifically proven by our group. The aim of the present study was to investigate the effect of aqueous bark extract of *G. arborea* on liver enzymes, hepatic oxidative stress markers in streptozotocin induced (STZ) diabetic rats through biochemical and histopathological parameters.

Wistar rats were divided into four groups (n=6/group); healthy untreated rats, STZ - diabetic untreated rats, diabetic rats receiving the aqueous bark extract of *G. arborea* (1.0 g/kg) and diabetic rats receiving glibenclamide (0.50 mg/kg). The treatment continued for 30 days. At the end of the study, blood was collected for the estimation of serum activities of liver enzymes [alkaline phosphatase (ALP), alanine aminotransferase (ALT) and aspartate aminotransferase (AST)]. The livers of all rats were excised for the estimation of total protein, reduced glutathione (GSH), activities of glutathione reductase (GR), glutathione peroxidase (GPx) and glutathione –S- transferase (GST). Histopathological assessment of liver tissue was done on haematoxylin and eosin stained sections. Results were compared with untreated diabetic rats.

The bark extract of *G. arborea* decreased the activities of liver enzymes; ALP, ALT and AST by 5%, 32%, and 13% respectively. The liver GSH, activities of GR, GPx and GST of plant extract treated diabetic rats increased to , 606.4 ± 8 µg/g liver tissue, 8.0 ± 1, 8.6 ± 1, 9.8 ± nmol/min/mg protein (statistically significant at $p < 0.05$, ANOVA followed by Dunnett's test) respectively. The extract was more effective than glibenclamide in restoring the values of the above biochemical parameters. Histopathological examination showed reduced number of microvesicular fatty changes and no congestion or necrosis in the liver tissue as compared to healthy untreated rats and provided supportive evidence for the biochemical analysis.

The results revealed that administration of aqueous bark extract of *G. arborea* markedly improves hepatic antioxidant status, reduces the oxidative stress and thus posseses an *in vivo* antioxidant activity in STZ - diabetic rats.

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