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Antidiabetic and antiaging role of Metformin on metabolic parameters in kidney of diabetic aging female rats

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Objectives: The objective of this study was to investigate renoprotective effects of metformin on renal function, mitochondrial and antioxidant enzymes, oxidative stress biomarker, DNA degradation and expression of glucose transporters in of diabetic aging female rats.

Methods: Young (3 months) adult (12 months) and aged (24 months) rats will be diabetic by using alloxan monohydrate. Metformin was administered i.p. at a dose of 200 mg/kg/day for 30 days to both control and diabetic aging rats. A detailed study was carried on membrane fluidity, lipofuscin, antioxidant enzymes and DNA degradation to identify the antidiabetic and antiaging role of metformin using biochemical ,molecular and histiochemical study. Renal function was assessed by measuring proteinuria, enzymuria, expression of glucose transporters, renin-angiotensin system, and activities of polyol pathway enzymes.

Results: Present study shows that there was a similar pattern of increased lipid peroxidation, lipofuscin, DNA degradation and glucose transporters expression with upregulation of renal angiotensin-converting enzyme and a decrease in membrane fluidity, glutamate dehydrogenase , Na^+ K^+ ATPse, antixodant enzymes activities in both aging and diabetes. Metformin treatment helped to reverse the age related changes studied, to normal levels, elucidating an anti-aging, antidiabetic and renoprotective action. Metformin effectively countered the diabetes-induced structural abnormalities of renal tissue of aging rats.

Conclusions: Metformin was found to be an effective treatment in stabilizing and normalizing the renal functions; therefore this therapy can be considered an alternative to be explored further as a means of diabetic and aged related disorders control. The results of this study will be useful for pharmacological modification of the renal function process and applying new strategies for control of metabolic syndrome.