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Piperine, a Natural Compound from Black Pepper, Controls Blood Sugar Level Through Insulin Receptor and GLUT-2 Mediated Signaling in Hepatocytes †

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Abstract: Type-II diabetes mellitus is an increasingly prevalent disorder worldwide. India is reported to be the diabetic capital of the world. The contemporary treatment for type II diabetes involves insulin and drug therapies. The conventional drugs used are not able to cope with the multifactorial exhibit of type-II diabetes. The administration of medicinal plants either alone or conventional drugs has been shown to address the causes of type-II diabetes at various levels and improve the quality of diabetic patients. Among the numerous medicinal plants showing antidiabetic effect, Pepper is of particular interest in recent years due to its myriad of beneficial activities. Hence, the study aimed to investigate the antidiabetic activity of piperine on insulin signaling molecules in a high-fat diet and sucrose-induced type-2 diabetic model. In the present study, ***d***iabetes was induced in male Wistar rats, and piperine doses were administered (10, 20, 40, and 50 mg/kg body weight, respectively) for 30 days. Both 40 and 50 mg/kg doses significantly improved all the parameters checked in piperine-treated rats compared to the diabetic model. Piperine was able to significantly decrease body weight, blood glucose, serum insulin, HOMA-IR, oxidative stress markers, liver, and kidney function markers; conversely, it increased the serum testosterone, antioxidant enzymes (SOD, CAT, and GR), glucose oxidation, and glycogen concentration in the liver. Piperine also improved mRNA and protein expression of IR-β and GLUT-2. These findings confirm that piperine plays a significant role in the oxidation of glucose through the regulation of IR and GLUT2-mediated mechanisms in hepatocytes, and hence it may be used as therapeutic phytomedicine for the management of type-2 diabetes.

Keywords: Piperine; high fat diet; liver; insulin resistance; glucose oxidation; GLUT2.

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Conflicts of Interest

The authors declare no conflict of interest.