HYPOGLYCEMIC AND HYPOLIPIDEMIC ACTIVITY OF BIOMASS AND AQUEOUS EXTRACT OF BLUE GREEN ALGA SPIRULINA IN DIABETIC RATS

By

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B.Sc. Agric. Sc. (Agric. Biochemistry), Ain Shams University, 2006
M.Sc. Agric. Sc. (Agric. Biochemistry), Ain Shams University, 2012

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ABSTRACT

Salwa Mahmoud El-Sayed Sedeek: Hypoglycemic and Hypolipidemic Activity of Biomass and Aqueous Extract of Blue Green Alga *Spirulina* in Diabetic Rats. Unpublished Ph. D. Thesis, Department of Agricultural Biochemistry, Faculty of Agriculture, Ain Shams University, 2018.

This study aimed to evaluate hypoglycemic and hypolipidemic activities of *Spirulina platensis* (SP), its ethanolic (SPE) and aqueous extracts (SPA) and bioactive components (phycocyanin (PC), phycocyanopeptide (PCP) and phycocyanobilin (PCB)), which isolated from alga on male STZ-induced diabetic rats. For this reason, male albino rats were equally divided randomely into nine groups designated as normal control, diabetic control, diabetic + glibenclamide drug (600 µg/kg body weight), which used as a common hypoglycemic drug for type 2 diabetes (T2DM) (Drug reference control), diabetic + *Spirulina platensis* biomass suspension (50 mg/ml/kg body weight), diabetic + ethanolic extract (50 mg/kg body weight), diabetic + water extract (50 mg/kg body weight), diabetic + phycocyanin (50 mg/kg body weight), diabetic + phycocyanopeptide (49 mg/kg body weight) and diabetic + phycocyanobilin (982 µg/kg body weight). The results show a statistically significant reduction ($P \leq 0.05$) level of fasting serum glucose, α-amylase activity, insulin resistance, lipids levels, liver and kidney functions and oxitative marker (malondialdehyde) in diabetic rats treated with *Spirulina platensis*, its extracts (SPE and SPA), PC, PCP and PCB compared with diabetic control. There was a marked decrease in these parameters in diabetic rats treated with ethenolic extract of *Spirulina platensis*, phycocyanin, phycocyanopeptide and phycocyanobilin compared with diabetic rats treated with glibenclamide drug. Also, there were an increase in HDL –cholesterol levels and β-cells function in these treatments compared with diabetic control. Histopathologically, diabetic rats treated with *Spirulina*, ethanolic extract, PC and PCP induced a slight improve of pancreatic islets and an obvious recovery of pancreatic cells. The

expression of insulin secretion from cells (β-cells) of diabetic rats was improved in the groups treated with spirulina, ethanolic extract, phycocyanin, phycocyanopeptide compared with glibenclamide drug. While, diabetic rats treated with phycocyanobilin recorded insulin levels lower than them. From this study it can be concluded that *Spirulina platensis*, ethanolic extract, phycocyanin, phycocyanopeptide and phycocyanobilin possessed hypoglycemic, insulin sensitivity and hypolipidemic effects. The antidiabetic effect of ethanolic extract attribute to the presence of phenolic compounds which has antioxidant activity. In addition, the antidiabetic effect of PC is most likely due to its ability to reduce of insulin resistance, enhance β-cell function and recovery β-cells. This effect of PC is attributed to selenium-binding phycocyanopeptide responsible for the antioxidant activity and chromium-binding phycocyanopeptide which activates of insulin receptors.

Key words: *Spirulina platensis*, Phycocyanin, Phycocyanobilin, Diabetes Mellitus, Hypoglycemic, Hypolipidemic, Insulin Resistance.

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