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Biography

JMA Hannan earned a PhD in pharmacology from University of Ulster, UK. He started his research career as research officer at the department of pharmacology, research division, BIRDEM, Dhaka, Bangladesh. He is the founder chairman of the department of pharmacy, North South University, Dhaka currently working as professor and head of the department of pharmacy in the Independent University, Bangladesh (IUB), Dhaka. He has over 20 years of teaching and research experiences with 76 full publications and 93 abstracts to his credit. He published a textbook on 'Medical and Pharmaceutical Statistics'.

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Note:

SPIRULINA PLATENSIS STIMULATES GLUCOSE-STIMULATED INSULIN SECRETION IN PERFUSED RAT PANCREAS AND BRIN-BD11 CELLS THROUGH THE cAMP-DEPENDENT PKA PATHWAY

Background and Aim: The antihyprglycemic effects of *Spirulina platensis* has previously been reported in rats and humans. In this study the effects of *S. platensis* were evaluated on insulin secretion together with exploration of its mechanism underlying insulin action in isolated perfused rat pancreas and BRIN-BD11 cells.

Method: The ethanolic extract was successively partitioned using hexane, chloroform, ethylacetate and 1-butanol. Butanol part was dissolved in Krebs-Ringer bicarbonate (KRB) buffer solution (pH adjusted to 7.4), continuously bubbled with O2 and perfused, via a cannula into the aorta, to the celiac and mesenteric arteries of pancreas, isolated by surgery under pentobarbital anesthesia. Insulin in the effluent (collected from a cannula in the portal vein at 1 min interval) was measured by an ELISA technique with a rat insulin assay kit. Insulin secretory activity was also observed using rat clonal β-cells (BRIN-BD11 cells). For the studies on the mechanism underlying the insulin secretory activity, 16.8 mM glucose, 30 mM KCl, 50 μM verapamil, 300 μM diazoxide and 10 mM theophylline were used.

Result: The butanol fraction of *S. platensis* substantially increased insulin release 1.4 - 4 fold (compared to 5.6mM glucose, $P<0.05$ – $P<0.001$) in a dose dependent manner at concentrations 8 to 5000μg/ml from BRIN-BD11 cells. The butanol fraction produced 10-fold increase in insulin secretion from perfused pancreas ($p<0.01$). Perfusion of pancreas with fraction along with 16.8 mM glucose caused a significant ($P<0.01$) steep rise of insulin release. The infusion of diazoxide (300 μM), (a KATP channel opener) and Verapamil (50 μM), (a voltage-dependent Ca2+ channel blocker) in presence of 16.8 mM glucose did not significantly affect insulin secretion by *S. platensis*. Therefore, this study indicating that effect was not associated with changes in glucose metabolism, Ca^{2+} signals or KATP channel activity. The fraction increased insulin secretion in presence of a cAMP competitor (theophylline, 10mM) significantly ($p<0.01$) from perfused pancreas. Diazoxide and verapamil did not significantly inhibit the insulin enhancing effects of the fraction in BRIN-BD11 cells. The fraction also stimulated insulin release from chemically depolarized BRIN-BD11 cells incubated with 30 mM KCl at 16.7 mM glucose. The augmentation of insulin secretion in completely depolarized conditions and in presence of cAMP competitor (theophylline) is strongly suggestive of an action on second messenger systems, such as adenylate cyclase-cAMP or phosphatidylinositol pathway, or on exocytosis.

Conclusion: These data suggest that butanol fraction of *S. platensis* may be capable of improving insulin secretion in type 2 diabetes by a variety of actions.