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In vitro screening and *in vivo* evaluation of hypoglycemic potential of *Wrightia tinctoria* seeds and *Enterococcus* spp. in alloxanized diabetic mice

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Herbal and probiotic treatments are one of important pharmacological strategies against diabetes mellitus. The present study was designed to evaluate the anti-diabetic potential of *Wrightia tinctoria* and *Enterococcus* spp. in alloxanized (150 mg/kg body weight) type II diabetic mice screened by various *in vitro* tests. To check *in vivo* efficacy, doses of *W. tinctoria* (200 and 400 mg/ml), *Enterococcus* spp. at concentration of CFU 1011 and combination of both were given to diabetic mice. A group treated with acarbose was also included as standard for comparison. *In vitro* results showed that methanolic extract *Wrightia tinctoria* seeds exhibited the inhibition of α-amylase activity (88.64% at 100 mg/ml), inhibition of hemoglobin glycosylation (88.4% at 3.56 mg/ml), and inhibitory effect on glucose uptake by yeast cell (91.62% at 500 mg/ml), while *Enterococcus* spp. presented glucose adsorption capacity (26.2%) at CFU 1011. *In vivo* evaluation showed protective effect of methanolic extract of *W. tinctoria* seeds and *Enterococcus* spp. towards serum glucose level and histological studies of pancreas in normal range as evidenced by following administration of extract and probiotic. Among all doses applied to alloxanized mice, *W. tinctoria* (400 mg/kg body weight) and combination of both *W. tinctoria* and *Enterococcus* spp. (200 mg/ml and 60 µl at concentration CFU 1011, respectively) showed the most significant reduction in blood glucose level which was almost equal to the standard drug acarbose. Moreover, they were not found to have any toxicological effect in liver function test, renal function test and lipid profile.

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Improving the viability of pseudo-islet for efficient insulin production

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A novel solution for type 1 diabetes mellitus (T1DM) is the formation of pseudo-islet cell, which are beta cells aggregations that mimic the basic function of beta cells. Central necrosis of pseudo-islet cell due to the shortage of the oxygen and nutrient transportation has been an obstacle to introduce this solution for the patient with T1DM. This study aims to overcome the issue by removing the central area of the pseudo-islets and replacing it with the cell-friendly alginate hydrogel "gelatin beads" type B (GBs), which is characterized by providing a high diffusion rate, and capable to function as a drug carrier. In order to maximize the diffusion rate and avoid the dissolution of the beads in the water solution, it is important to control the right size, shape of GBs and the cross-linkage time. Increase in viability and morphology is seen in the 30 µm GBs cross-linked for six hours. The rat pancreatic β cell line BRIN-BD11 cells were grown in RPMI 1640 media and showed similar morphology of the native human islet cells after the GBs incorporation. Alexa Fluor 568 conjugate was used as a secondary antibody in the fluorescence test to examine the drug releasing capability of the GBs. The effect of the anti-inflammatory cytokine IL-10 on pseudo-islets can be determined by using dose response which reveals the best response at 10 ng/ml concentration. Improving our understanding of the methods used to remodel pseudo-islets is needed to make possible strategies for developing *de novo* islet cells for therapeutic applications.

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