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Bioavailability and antihyperglycemic effect of Metformin transfersome vesicles in transdermal patch delivery system

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Metformin, a prominently prescribed antihyperglycemic agent has been proven to increase life span of both diabetic and non-diabetic individuals. It decreases glucose production and absorption, and increases body's response to insulin. However, it is slowly and incompletely absorbed in the gastrointestinal tract; and it has a low permeability. It is available in oral tablet and it takes 6 hours for the drug to be completely absorbed. It is taken 2 to 3 times a day as a maintenance drug, depending on patient's condition. Gastrointestinal side effects have also been reported in nearly 30% of patients. With these impediments, different drug delivery systems have been developed. The use of transfersomes in transdermal patch offers the potential advantage of improving the bioavailability of the drug. Metformin Transfersome Vesiscles were prepared using Sodium cholate and Phosphatidylcholine 50%, and its particle size was 168 nm. Drug Entrapment Efficiency was determined using HPLC and it was found to be 94.96%. Plasma concentration of metformin in hyperglycemic-induced rabbits treated with Metformin transfersome patch was significantly higher than controls (p=0.001). The post treatment glucose level of hyperglycemia-induced rabbits applied with Metformin transfersome patch (p=0.002) showed significant decrease in glucose level relative to untreated alloxan-induced hyperglycemic rabbits. The study showed that metformin transfersome vesicles in transdermal patch delivery provide enhanced antihyperglycemic effect and bioavailability over metformin transdermal patch.

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Design and development of vegetable capsule films from A. esculentus and carageenan mucilage polysaccharides

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Capsule is one of the most versatile routes of dosage forms in drug delivery. Gelatin was used to prepare capsule films since ancient times. Gelatin capsules had certain disadvantages like sensitivity to moisture, religious restrictions, special packaging which had lead to the establishment of synthetic polymers and/or plant-derived hydrocolloids for preparation of capsule materials. The main objective of this study is to prepare and characterize polysaccharide based empty vegetable capsule film materials from mucilage polysaccharides of *A. cesculentus* and carageenan. Mucilage polysaccharides were extracted from *A. esculentus* (upper crown head-biowaste) and red seaweeds by solvent extraction method at 85oC at 275 rpm/sec and purified. Capsule films were prepared by solvent casting method using *A. esculentus* and Carageenan mucilage polysaccharides dispersions. Empty capsule films were evaluated for surface morphology, mechanical properties. The mechanical properties of the film material were studied using an Instron Universal Testing Machine which indicated that the A. esculentus/carageenan polysaccharide blend films at the ratio of 0.5/0.5 had the highest tensile strength (TS) 6.8 Mpa and optimum % elongation 23% which was higher than the gelatin (control) film ($p \leq 0.05$). The *in-vitro* disintegration and dissolution time of empty capsule films from A. esculentus as well carageenan measured at different temperatures (25-45°C) and pH (4-8) was greater and desirable for both compared to that of gelatin capsule films. Therefore the above polysaccharides could act as potential agent in the development of various pharmaceutical ingredients such as empty capsule shell material, coating material with enhanced release rates, better patient compliance and effective therapy.

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