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Study to explore subsistence of host-guest inclusion complexes of significant drug molecules with α and β-cyclodextrins and their applications in pharmaceutical science

Mahendra Nath Roy

University of North Bengal, India

Abstract

Host-guest inclusion of two drugs, phenylephrine hydrochloride and synephrine with α and β-cyclodextrins and their applications in biological Sciences have been investigated by physicochemical and microbiological approach. Phenylephrine hydrochloride (PEH) is a selective α1-adrenergic receptor agonist of the phenethylamine class used primarily in cold and flu conditions as an antipyretic, analgesic drug to relief pain. Alkaloid synephrine (SNP) was first extracted as a natural product from the leaves of various citrus trees is used as bronchial muscle reluctant, increases blood pressure in the patients suffering from low blood pressure. The obtained 1:1 stoichiometry was further confirmed by two spectrometric methods, UV-Vis study and spectrofluorimetry. Significant shifts in IR stretching frequency also support the inclusion process. Relative stabilities of the inclusion complexes were established by the association constants obtained from UV-Vis spectroscopic measurements, program based mathematical calculation of conductivity data. Calculations of the thermodynamic parameters dictates thermodynamic feasibility of the inclusion process. Spectrofluorometric measurement scaffolds the UV-Vis spectroscopic measurement validating stability of the ICs once again. Mass spectroscopic measurement gives the molecular ion peaks corresponding to the inclusion complex of 1:1 molar ratio of host and guest molecules. The mechanism of inclusion was drawn by 1H-NMR and 2D ROESY spectroscopic analysis. Surface texture of the inclusion complexes was studied by SEM. Finally, the cytotoxic activities of the inclusion complexes were analyzed and found, Cell viability also balances for non-toxic behavior of the ICs. Moreover, all the studies reveal the formation of inclusion complexes of two ephedra free, alternatively emerging drugs (after their banned product having ephedra) SNP, PEH with α and β-CD which enriches the drug delivery system with their regulatory release without any chemical modification. Structural characterization of Host-Guest inclusion complexes of α-CD and β-CD with two bio-active molecules, PEH and SNP were done over here in terms of geometry and structural preferences by means of a variety of physical and spectroscopic methods in solid state and solution phase. Now it is imperative to find out the suitability of PEH as the same done by the Phenylpropanolamine, pseudoephedrine and ephedrine for the treatment of nasal or sinus congestion and to find out the way of delivery with biocompatibility. Alkaloid synephrine (SNP) was first extracted as a natural product from the leaves of various citrus trees are used as bronchial muscle reluctant, increases blood pressure in the patients suffering from low blood pressure. Its presence and positive retort as a bio-marker makes the orange juice like soft drinks authentic. Lipolytic stimulation by synephrine increases thermogenesis which leads to the increase in metabolic rate and fat oxidation. In weight loss products as well as in the dietary supplement “ephedra free” synephrine is frequently used and starts to earn enormous attention after the banned product ephedrine. Most of the cases patients suffering from obesity are often found to suffer from type-2 diabetes and hence synephrine in weight loss products frequently becomes beneficial to the diabetic patients.

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