

**SODIUM ALGINATE BEADS CONTAINING PEPPERMINT OIL: DEVELOPMENT AND CHARACTERIZATION *IN VITRO*, *IN VIVO* AND *EX-VIVO* TECHNIQUE.**

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**ABSTRACT**

Peppermint oil (PO) is the most prominent oil using in the pharmaceutical formulations. In this sense, this oil is attracting deep attention by the scientific community due to its traditional therapeutic claim; biological and pharmacological potential in recent research. The current study deals with the development, optimisation, *in vitro* characterisation, *in vivo* gastrointestinal tract drug distribution and *ex-vivo* mucoadhesive properties of PO loaded-entrapped sodium alginate beads. The factorial design was conducted to optimise the formulation using Minitab version 17. The average % of yield was 89.46% (n=3/batch). The optimised beads showed high drug encapsulation efficiency 91.31±3.20% and suitable drug release pattern in gastrointestinal media (cumulative drug release after two-hour of 98.57±1.78%). The mean size and sphericity factor of these formulated beads containing peppermint oil ranged from 0.75±0.01 to 2.64±0.01 mm and 0.05±0.005 to 0.01±0.00 mm. On the other hand, a very low release has found in acidic media (pH 1.2) at two-hour of from 2.39±0.27 to 7.71±0.86%. It found to be dominant by first-order kinetic ( $R^2 = 0.926-0.975$ ) and Hixson-Crowell model ( $R^2 = 0.831-0.983$ ) with a correlation coefficient close to unity over two-hour. It has shown excellent floating behaviour over two-hour, mucoadhesive, swelling and GIT distribution properties in *ex-vivo* over 2 & 6 h. The high voltage assisted electrospray technique is the novel encapsulation process which made this formulation unique. The technique for the preparation of sodium alginate beads containing peppermint oil was found to be simple, reproducible, easily controllable, economical and consistent. Besides, the raw materials used for the formulation in this study such as sodium alginate, lecithin, calcium chloride and peppermint oil were cheap and easily available. This new approach to sustainable development goal is going to take a step forward, through a wider contribution to the pharmaceutical sector.

**Keywords:** Peppermint oil, emulsion, electrospray technique, microencapsulation

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