

A REVIEW ON MICRO-BALLOONS

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ABSTRACT

Oral prolonged release systems are manufactured to release the drug *in-vivo* with privies to enhance bioavailability, diminish untoward effects and enhance effectiveness of drugs. Microballoons or hollow microspheres are anticipated to persist buoyant in a permanent way upon the gastric ingredients. The various formulations comprise unfilled microspheres, powders, capsules, tablets and laminated films. Micro-balloons are distinctly attaining attention due to their immense significance in the drug targeting to the stomach. These floating micro-balloons have the convenience that they stay buoyant and circulate uniformly over the gastric ingredients to refrain the variations of gastric emptying and release the drug for extended period of time. Multiparticulate particles of low density can efficiently prolong the gastric retention time of drugs. This article provides an insight of fabrication and methods of evaluation of micro-balloons.

Keywords: Micro-balloons, Preparation, Evaluation, Gastric retention, Bioavailability, Chitosan.

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INTRODUCTION

Oral route of drug administration is the most advantageous and widely utilized method of drug administration, and the development of stomach specific oral controlled-release delivery systems is a challenging job due to the variation of pH in different segments of gastrointestinal tract, the fluctuation in gastric residence time and the difficulty in concentrating an oral drug delivery system in a confined area of the gastrointestinal tract. Fast gastrointestinal transit can reduce the absorption of complete drug in the absorption zone and decrease the efficiency of dose administered as most of drugs are absorbed in the stomach or starting part of small intestine. ^{[1][2]}

Polymers are generally employed in the development of micro-balloons. A number of different substances have been investigated for the preparation of micro-balloons; these materials include polymers of natural origin or synthetic origin and also semi synthetic substances. Floating micro-balloons can be prepared by using both hydrophilic and hydrophobic polymers. The idea of floating or hollow micro-balloons can also be employed to reduce the irritation caused by weakly acidic drugs on stomach by clearing out direct touch with the gastric mucosa and imparting a mean of providing a low dosage for prolonged periods. ^{[3][4][5]} Prolonged delivery of active ingredient will abbreviate these toxicities considerably by maintaining a low and persistent level of drug in the plasma. Therefore, micro-balloons have pop up as a logical means of increasing gastric residence time, targeting stomach

mucosa, and thereby improving the bioavailability. Micro-balloons stay buoyant as they have lower density with respect to gastric and intestinal juice. They are not concerned to 'all or nothing' gastric emptying variation of a unit dose formulation and release the drug in a predictable fashion.

Preparation of Micro-balloons

These micro-balloons are exclusively free flowing powders comprising of proteins or non-biodegradable polymers, usually having a size less than 200 microns. Solid biodegradable microspheres include a drug dissolved or dispersed uniformly through the matrix of particles having the prospective for prolonged drug release. Micro-balloons are manufactured by the method of solvent diffusion and evaporation methods to fabricate the empty or hollow inner core. The polymer is usually dissolved in an organic vehicle and the drug is preferably dissolved or dispersed in the polymer solution. The solution having the drug is then subjected to emulsification into an aqueous phase containing polyvinyl alcohol to make oil in water emulsion. After the initiation of a stable emulsion, the organic solvent is now evaporated by increasing the temperature under pressure or by stirring continuously. The removal of solvent leads to precipitation of polymer at the o/w interface of droplets, constructing a cavity and thereby making them hollow to convey the floating properties.

The polymers analysed for the development of these systems comprises chitosan, cellulose acetate, eudragit, methocel, polyacrylates, polyvinyl acetate, agar, carbopol, polyethylene oxide and polycarbonates.

Evaluation of Micro-balloons

The micro-balloons can be evaluated for the following-

1. Surface Morphology^[6]
2. Flow Properties^[7]
3. Buoyancy test for micro-balloons^{[8][9][10]}
4. Yield of Micro-balloons^[11]
5. Percent Drug Loading^{[12][13]}
6. *In vitro* dissolution studies^[14]
7. Stability of micro-balloons at gastric pH^[15]
8. IR Spectroscopic Studies^{[16][17]}

CONCLUSION

Micro-balloons are novel drug delivery systems which are supposed to float in a prolonged way over the gastric contents. Floating micro-balloons have the advantage that they remain buoyant and distributed uniformly over the gastric fluid to avoid the variations of gastric emptying and release the drug for prolonged periods of time. The micro-balloons are characteristically free flowing powders consisting of proteins or synthetic polymers, ideally having a size less than 200 micrometer. The micro-balloons are prepared by solvent diffusion and evaporation methods to create the hollow inner core. The micro-balloons can be evaluated for surface morphology, flow properties, buoyancy, yield, percent drug loading, *in vitro* release, stability at gastric pH, and FT-IR studies. The floating micro-balloons are the promising candidates for the development of gastro retentive drug delivery system for potential therapeutic use.

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CONFLICT OF INTEREST

None of the author has any conflict of interest in the context of this work.

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