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FORMULATION OF OMEPRAZOLE NIOSOMES AND ITS CHARACTERIZATION

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ABSTRACT

In the present study an attempt has been made to prepare niosomes. The niosomes formulation has got various advantages over conventional dosage form; these persist in the blood for a longer time than conventional and can thus greatly improve the therapeutic effect of drug. The niosomes are prepared by Reverse phase evaporation technique using a homogenizer. Omeprazole was selected as candidate drug, since it has been one of the major antacid and antiulcer agents used in the treatment of various types of diseases associated with GIT. Niosomes are characterized for its size range, entrapment efficiency and invitro release of drug. For release study the phosphate buffer saline pH 8.6 was used and the samples were assayed spectrophotometrically at 306 nm. The data obtained proved that the formulation was useful for the controlled release of drug because percentage release after 24 hours was nearly to 100%.

Key words: Omeprazole, *in vitro* study and entrapment efficiency.

INTRODUCTION

Niosomes are formed from the self-assembly of non-ionic amphiphiles in aqueous media resulting in closed bilayer structure[1]. These structures are analogous to phospholipid vesicles (liposome) capable of entrapping hydrophilic and hydrophobic solutes and serves as drug carrier. The low cost, greater stability and resultant ease of storage of non-ionic surfactant has lead to the exploitation of these compounds as alternatives to phospholipid. Niosomes are essentially non-ionic surfactant based multilamellar or unilamellar vesicles in which an aqueous solution of solute is entirely enclosed by a membrane resulted from the organization of surfactant macromolecules as bilayers[2]. Similarly to liposome, niosomes are formed on hydration of non-ionic surfactant film, which eventually hydrates imbibing or encapsulating the hydrating aqueous solution[3].

Emphasis has been placed on slow release of drug, resulting into controlled activity, reduced toxicity, targeting and modification of distribution profile of drug as aims of vesicular systems development.

Niosomes have been prepared from several classes of non-ionic surfactant eg. Polyglycerol alkyl ether, glucosyl dialkyl ether, crown ether and polyoxyethylene ether[4]. Among these sorbiton esters (span) are most commonly used non-ionic surfactant in niosomes preparation as it has shown promise of commercial exploitation and is generally regarded as safe. In this study span-60 is used to check the invitro release of omeprazole.

Omeprazole is a white to off-white crystalline powder, freely soluble in ethanol & methanol slightly soluble in acetone and very less soluble in water. Numerous studies have been carried out in order to achieve a controlled release formulation; niosomes is one of the best formulation to controlled the drug release The main goal of this study is to prepare Omeprazole niosomes which

are effectively used in the treatment of ulcerative colitis, inflammatory bowel syndrome, gastric, duodenal and peptic ulcer with low toxicity and biocompatible form.

MATERIAL AND METHODS

Omeprazole was supplied by HETRO DRUG LTD. HYDRABAD INDIA, Span-60 & Sodium lauryl sulphate was obtained from STANDARD FINE CHEM. LTD MUMBAI INDIA, Diethyl ether, and Chloroform was obtained from CENTRAL DRUG HOUSE (P) LTD. INDIA. All other reagents were of analytical and Pharmaceutical grade.

Preparation and characterization of Niosomes

The method used in the preparation of Niosomes was a modification of reverse phase evaporation technique[5].

In this span-60 and cholesterol (1:1) were dissolved in a mixture of diethyl ether chloroform (1:0.25), 5 ml of aqueous phase containing Omeprazole drug (4 mg/ml) was added to this and the resulting two phases system was homogenized using a homogenizer at 4-5°C for 3 min. and 800 rpm[4]. The resulting clear gel was again homogenized for 2 min. with addition of 1 ml of phosphate buffer saline. The suspension was then heated on a water bath at 60°C for 10 minutes.

Determination of Particle size

A number of techniques are used to determine the particle size but in this study the size of Omeprazole niosomes were determined by Light Microscopy Method[6].

Entrapment efficiency

After preparing niosomal dispersion untrapped drug is separated by centrifugation method[7]. The drug remaining entrapped in niosomes is determined by complete vesicle disruption using 50 % n-propanol and was calculated as-

$$\text{Entrapment efficiency} = \frac{\text{Amount entrapped}}{\text{Total amount added}}$$

In-vitro release Study

A study was done on the release pattern of the niosomal formulation. 1 ml of niosome suspension was pipetted into the dialysis bag[6], which was previously soaked and washed several times with distilled water. This was placed in 25 ml of phosphate buffer saline pH 8.6 and kept with constant agitation on a magnetic stirrer, maintained a temperature of 37°C, 5 ml samples were withdrawn periodically and after each sample same volume of medium was replaced. Then the samples were assayed spectrophotometrically (SHIMADZU) at 306 nm using medium as blank.

RESULTS AND DISCUSSION

Size of Niosomes

Particle size was studied under the light microscopy and size varies from 0.01-1.0 mm shown in Table-1.

Table-1: Size Range of Omeprazole Encapsulated Niosomes

Size Range (mm)	% Niosomes
0.01-0.5	35-42
0.1-0.5	37-41
0.5-1.0	11-20
>1.0	6-10

Table-2: Percentage of Entrapment Efficiency

Niosome Type	Initial Drug (mg)	Drug After Lysis (mg)	% Entrapment Efficiency
Niosome with Span-60	5.721	5.13	57.21

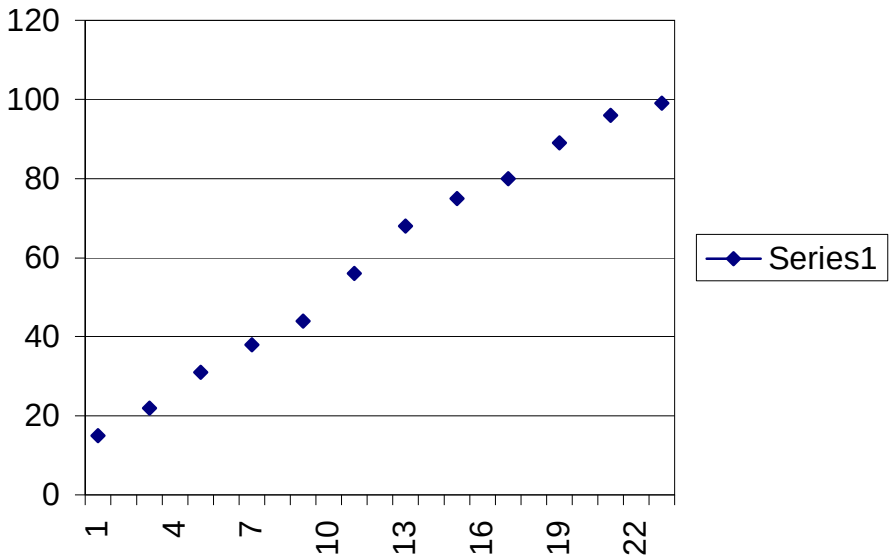

Fig. - 1: *In vitro* Release Profile of Omeprazple Niosomes

Drug Entrapment Efficiency

It is the important to determine the amount of drug entrapped in the niosomes before proceeding further into their physical behavior. The entrapment efficiency was found to be 57.21. The results are shown in Table -2.

***In-vitro* Release Role**

The in-vitro release of Omeprazole encapsulated niosomes are tabulated in Table-3 and graphically plotted as shown in fig-1. In-vitro profile of niosome has shown 99.92% release in 24 hrs, there by showing the controlled release pattern.

Omeprazole niosomes prepared by Reverse phase evaporation technique employing span –60 as a non-ionic surfactant, cholesterol and PEG with ratio 1:1:0.1 was found to be spherical in shape, the size range of the formulated niosome was 0.01-1.0 mm, which was a size range of large unilamellar vesicles (LUV_S). The entrapment efficiency of drug was excellent (57.21%). The in-vitro release profile of Omeprazole from niosome

Table - 3: *In vitro* Release Profile Of Niosomal Encapsulated Omeprazole

Time (Hrs.)	Absorbance (mean) S D	Cumulative % Release
1	0.181 ± 0.005	8.57
2	0.140 ± 0.006	15.19
4	0.158 ± 0.001	22.79
6	0.185 ± 0.082	31.56
8	0.137 ± 0.010	38.18
10	0.123 ± 0.006	44.02
12	0.298 ± 0.024	58.44
14	0.203 ± 0.005	68.18
16	0.170 ± 0.010	76.36
18	0.129 ± 0.007	82.59
20	0.149 ± 0.003	89.60
22	0.084 ± 0.008	93.69
24	0.131 ± 0.007	99.92

preparation showed that using span-60 surfactant, maximum drug was released and the release was more than 99% in 24 hrs. It appears from the present study that niosome prepared by Reverse phase evaporation technique may be suitable carrier for local anti-ulcerative, antacid and also in the treatment of bowel inflammatory syndrome, ulcerative colitis by increasing the therapeutic efficiency by prolonged drug action.

Conclusion

From the present study it is concluded that Omeprazole niosomes were prepared by Reverse phase evaporation method may lead to the production of spherical, stable, uniform vesicles with excellent encapsulation efficiency. These niosomes may have used potentials in delivering therapeutic to sites other than liver and prolonging the duration of action. A prolong release of drug for 24hrs. noticed by the noisome it can be considered as best formulation. We conclude from present study that the development of Omeprazole encapsulated niosomes may pave the way for the effective treatment of different diseases.

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