ENHANCEMENT OF ENTRAPMENT EFFICIENCY OF POROUS CHITOSAN SCAFFOLD FORMULATION BY THE ADDITION OF PEG 4000

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INTRODUCTION

Porous scaffold formulation is used for delivering the drug continuously to the target place but the major limitation face that poor entrapment efficiency. The objective of this study was enhancement of entrapment efficiency of porous chitosan scaffold formulation with the help of PEG 4000.

MATERIALS AND METHODS

POROUS CHITOSAN SCAFFOLD PREPARATION

Briefly different concentration of chitosan and PEG 4000 were dissolved in 0.2 M glacial acetic acid and mixture of solution was poured into stainless steel mould and mould was stored in deep freezer at -70^0C for 5 days. After 5 days, mould was placed in lyophiliser (Martin Christ alpha 1-2 LD plus, Germany) for 3 days. After 3 days, blank porous chitosan scaffold was prepared. Gliclazide (GLZ) drug (0.1%) was dissolved in ethanol and poured into porous matrix scaffold with the help of pipette using a post seeding method and drug loaded porous chitosan scaffold formulation was prepared [1].

ENTRAPMENT EFFICIENCY OF SCAFFOLD FORMULATIONS

Briefly, one piece of scaffold formulations was placed in 10 ml centrifuge tube, which was filled with PBS (pH 7.4) solution, for 20 minute at 5000 rpm centrifugation speed, in centrifuge machine (Remi R-8C). Absorbance of supernatant was checked at the λmax. Value of 226.5 nm using UV-VIS spectrophotometer (Shimadzu UV 1700). PBS was used as a control. The % entrapment efficiency of the scaffold formulations were calculated from the following equation. Entrapment efficiency (%) = $D_L - D_F / D_L$ x 100, where D_L and D_F are initial drug loaded (mg) and free drug (mg) respectively [2].

RESULTS AND DISCUSSION

ENTRAPMENT EFFICIENCY OF GLICLAZIDE LOADED CHITOSAN SCAFFOLD FORMULATIONS

6 different scaffold formulations were examined for entrapment efficiency. The effects of processing parameters such as polymer concentration, PEG 4000 concentration on the GLZ entrapment efficiency (EE) of scaffold formulations are presented in Table 1. It was observed that the EE of GLZ increased with an increase in the PEG 4000 concentration from 0 – 2.5%.

Table 1. Effects of various processing parameter on entrapment efficiency of GLZ in chitosan-PEG 4000 porous scaffold. Each data point represents a mean ± standard deviation (n=3).

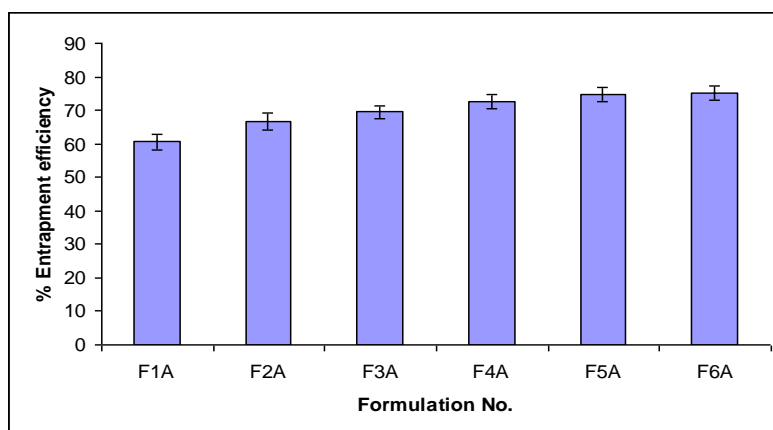| Formulation No.	Chitosan (%)	PEG 4000 (%)	Entrapment efficiency (%)
F1A	1	-----	60.52 ± 2.49
F2A	1	0.5	66.64 ±2.65
F3A	1	1.0	69.46±2.03
F4A	1	1.5	72.68 ±2.23
F5A	1	2.0	74.76 ± 1.98
F6A	1	2.5	75.10 ± 2.02

Fig 1. Entrapment efficiency of gliclazide loaded scaffold formulation (mean ± S.D., n=3)

Drug entrapment efficiency of scaffold formulations prepared with 1% chitosan with increasing concentration of PEG 4000 (0-2.5%) showed variable drug entrapment efficiency. Increasing concentration of PEG 4000 from 0 – 2.5%, increased % drug entrapment efficiency in scaffold formulations prepared with 1% chitosan. This is obviously due to the formation of high porous structure and more drugs were entrapped in it.

CONCLUSIONS
From this study, we concluded that, versatile carrier system i.e. porous scaffold formulation is effective for the delivery of gliclazide for long duration of time period because entrapment efficiency of porous chitosan scaffold increased by the addition of PEG 4000.

REFERENCES
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