

ORIGINAL RESEARCH

**GLIBENCLAMIDE MICROSPHERES:- AN APPROACH TOWARDS THE CURE OF TYPE-II DIABETES MELLITUS****Ashmita Das^{1*}, Susanta Paul², Sandip Kr. Pahari³, Mayukh Jana¹**¹ Bharat Technology, Department Of Pharmaceutics, Banitabla, Uluberia, Howrah² Seacom Skills University, Department of Pharmaceutics, Bolpur, Shantiniketan³ Bharat Technology, Department Of Medicinal Chemistry, Banitabla, Uluberia, Howrah**Submitted on: 25.02.18;****Revised on: 16.04.18;****Accepted on: 20.04.18****ABSTRACT:**

Microspheres are small spherical particles, with diameters in the Micrometer range (typically 1 μ m to 1000 μ m (1mm). microspheres are designed so as to enclose the drug molecule and thus produce a controlled drug release. Out of the several methods, normal polymerization is the process with benefits like less instrumentation and is less time consuming. Usage of ethyl cellulose imparts the water insoluble characteristics and provides a tough film while Sodium alginate helps in film formation by releasing alginate ions in the solution. The drug glibenclamide is an oral hypoglycaemic drug used in type 2 diabetes mellitus with a quick elimination rate. The aim of this work includes presenting a process that can produce a more sustained release by incorporating the drug into a microsphere drug delivery form.

KEYWORDS: Glibenclamide, Sodium alginate, Ethyl cellulose, Controlled Release, Microsphere.**Corresponding Author:** Ashmita DasE-mail:- dasashmita05@gmail.com**Indian Research Journal of Pharmacy and Science; 16(2018)1338-1343;****Journal Home Page: <https://www.irjps.in>****DOI: 10.21276/irjps.2018.5.1.12**

INTRODUCTION:¹

A spherical shell that is usually made of a biodegradable plastic polymer, that has a very small diameter usually in the micron or nanometer range that is often filled with a substance (as a drug or antibody) for release as the shell is degraded is called microsphere. Microspheres used usually made up of polymers which can be broadly classified into, Synthetic Polymers and Natural polymers. Here, the process of normal polymerization has been used which, is carried out using different techniques as bulk, suspension, precipitation, emulsion and micellar polymerization processes. In bulk, a monomer or a mixture of monomers along with the initiator or catalyst is usually heated to initiate polymerization. Polymer so obtained may be moulded as microspheres. Drug loading may be done during the process of polymerization. The polymers used during this process are sodium alginate and ethyl cellulose and the microspheres formed during this process enclose the 2nd generation oral hypoglycaemic drug, Glibenclamide. This drug serves to treat the patients

of type 2 diabetes mellitus. The apparent elimination half-life of Glibenclamide in oral dosage forms available ranges from 7 to 10 hours.^{1}

MATERIALS AND METHODS:^{2,3,4}**POLYMERS USED:-**

1. Sodium alginate.
2. Ethyl cellulose.

CHEMICALS USED:-

1. Calcium chloride.
2. Distilled water.

DRUG USED: - Glibenclamide. (Glyburide)

METHOD USED:- Normal polymerization (Bead or pearl polymerization)

The process has been described below:-

Table No.1

TRIAL NUMBER	SOLUTION	INGREDIENTS	QUANTITY
TRAIL 1	A	CALCIUM CHLORIDE	5MG IN 50 ML WATER
	B	SODIUM ALGINATE + ETHYL CELLULOSE + DRUG.	SODIUM ALGINATE-0.5GM, ETHYL CELLULOSE-0.25, DRUG- 0.1GM IN 25 ML WATER.

Table No.2

TRIAL NUMBER	SOLUTION	INGREDIENTS	QUANTITY
TRAIL 2	A	CALCIUM CHLORIDE	5MG IN 50 ML WATER
	B	SODIUM ALGINATE + ETHYL CELLULOSE + DRUG.	SODIUM ALGINATE-0.75GM, ETHYL CELLULOSE-0.25, DRUG- 0.1GM IN 25 ML WATER.

Table No.3

TRIAL NUMBER	SOLUTION	INGREDIENTS	QUANTITY
TRAIL 3	A	CALCIUM CHLORIDE	5MG IN 50 ML WATER
	B	SODIUM ALGINATE + ETHYL CELLULOSE + DRUG.	SODIUM ALGINATE-1GM, ETHYL CELLULOSE-0.25, DRUG- 0.1GM IN 25 ML WATER.

OBSERVATIONS:-

According to the dissolution study the following results were obtained:-

Table No.4:- Plot of Time Vs Percentage of drug release:-

TIME(MINS)	% OF DRUG RELEASE IN TRIAL 1	% OF DRUG RELEASE IN TRIAL 2	% OF DRUG RELEASE IN TRIAL 3
10	0.48	0.32	0.33
20	2.89	1.79	0.48
30	4.83	3.03	3.13
40	8.69	5.69	7.62
50	13.52	9.22	12.88
60	18.84	12.14	17.32
70	21.73	16.52	20.13
80	27.05	20.02	25.15
90	32.85	24.55	31.81
100	36.71	29.89	38.79
110	42.99	37.27	41.12
120	47.34	45.47	45.77

Table No.5:- A Plot of Time vs Concentration.

TIME(MINS)	CONCENTRATION(mcg/ml)
0	0
5	0.666
10	0.207
15	0.302
20	0.432
25	0.535
30	0.598

Figure 1: Standard Curve of Glibenclamide

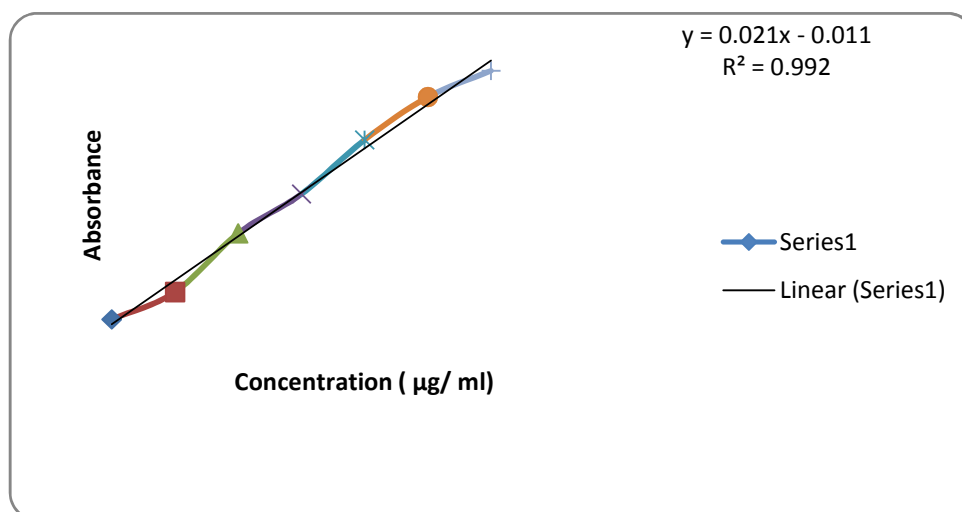


Figure 2: Zero order release kinetics of Batch B1

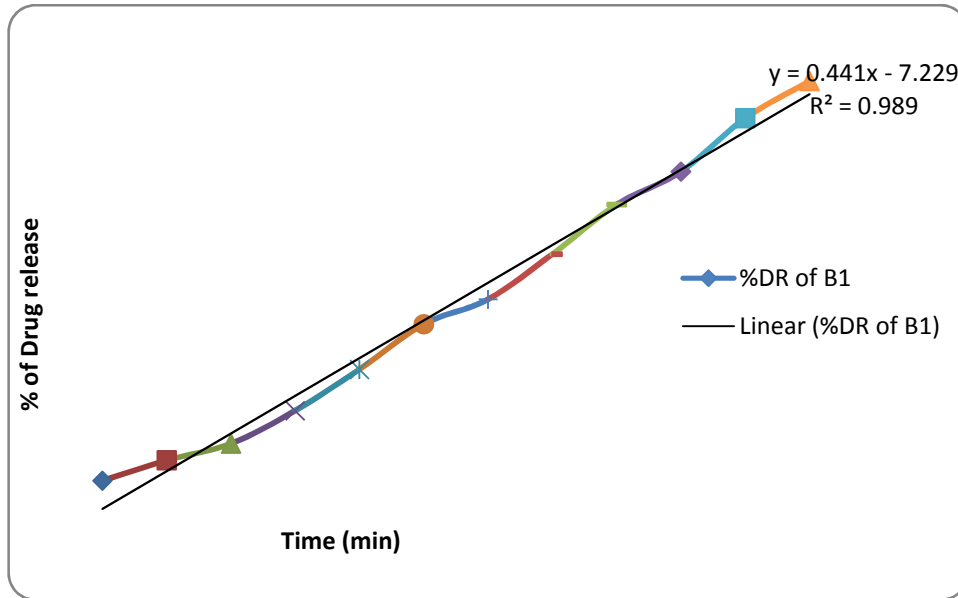


Figure 3: Zero order release kinetics of Batch B2

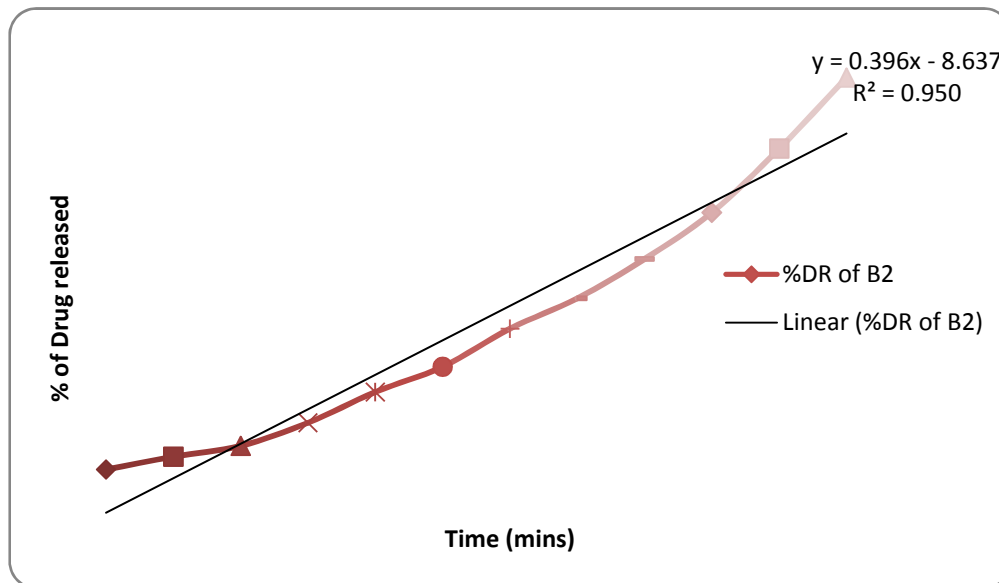
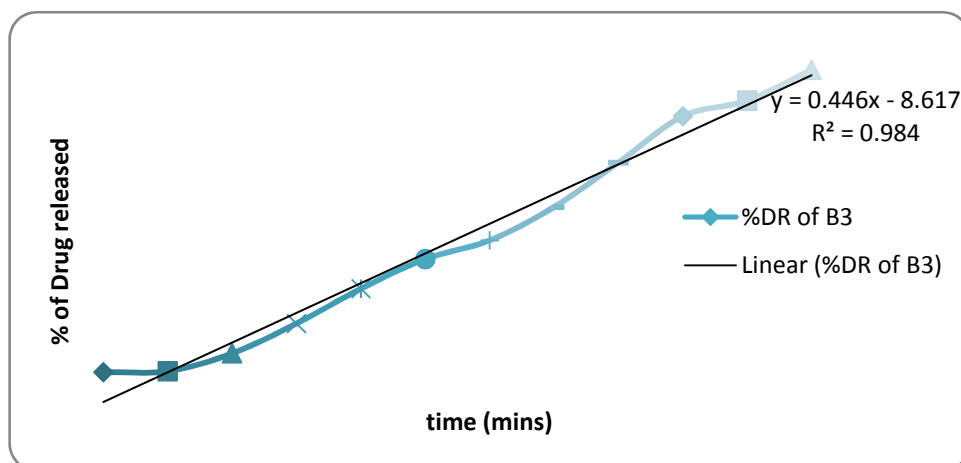


Figure 4: Zero order release kinetics of Batch B3**DISCUSSION:**

This study on Glibenclamide microsphere drug delivery system claims that in place of Glibenclamide tablets that are available at a dose of 5mg, this newer form of drug delivery can be more beneficial as it's better dissolution characteristics. As obtained from different survey a vast majority of the population today suffers from diabetes and this drug delivery form may help to reduce the patient population of diabetes. Effective targeting and reduction in drug dosage that are the main targets of a microsphere drug delivery system were aimed

during this study. This study may thus be a better and more efficient form of drug delivery in place of the conventional methods.

CONCLUSION:

From this study it is concluded that amongst the three batches of microspheres formulated the first batch which contained the least amount of sodium alginate amongst all the batches showed the best dissolution profile. Thus, the microsphere form of drug delivery can be used to treat the diabetic patients who have been on Glibenclamide treatment.

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CONFLICT OF INTEREST REPORTED: NIL ; SOURCE OF FUNDING: NONE REPORTED