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FORMULATION AND EVALUATION OF ANTI-DIABETIC SUSTAINED RELEASE MATRIX TABLETS USING PROCESSED ALOE VERA MUCILAGE AS RELEASE MODIFIER

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ABSTRACT

The main objective of the current study was to make and test continuous Repaglinide (RPGN) matrix pills using aloe vera mucilage treated as a release modifier. A long-acting tablet should release the required amount of medication with pre-determined kinetics in order to maintain the effective plasma concentration that can be performed by making the drug release in a predetermined and repetitive manner. These matrix tablets are compressed using a direct compression method. The structure of the different tablets was prepared using a different material: polymer ratio i.e., 1: 1, 1: 2, 1: 3, 1: 4, and 1: 5. Dry powder mucilage extracted from Aloe vera leaves was tested with a resting angle, LBD, TBD, Carr index, and Hausner scale. Prepared pills were tested according to pharmacopoeial standards. It was observed in kinetic research that all formulations follow the kinetics of the first order and in particular the drug release in its dosage form. The current work clearly demonstrates the possible use of ground aloe vera (PAG) to correct drug release using different dosages. We can conclude that the modified

matrix tablets that use PAG as mucilage can be used as a release mechanism in the formation of continuous matrix tablets.

Keywords: Sustained release matrix tablets, natural polymers, repaglinide, synthetic polymers, PAG

INTRODUCTION

Conventional dosage forms such as pills and pills are large oral preparations and are widely accepted up to 50-60% of the total form. Solid dosage forms are popular for easy administration, accurate dosage, self-medication, pain prevention and most importantly patient compliance over the past two decades. Repaglinide (+) 2-ethoxy-4 (2 ((3-methyl-1- (2- (1-piperidinyl)) phenyl) -butyl) amino) -2-oxoethyl) benzoic acid is an agent oral anti-hyperglycemic agents. in the treatment of non-insulin dependent diabetes (NIDDM). It belongs to the meglitinide class of short-acting insulin secretagogues, which bind to β-cells of the pancreas to promote insulin release. Much research has been done on the drug RPGN for further release and literature, it has been found to be composed of Repaglinide (RPGN) matrix tablets containing Aloe vera as a release modifier. The most widely used method of adjusting the release of the drug is the matrix system and therefore an attempt was made to create a simple and effective Repaglinide pill using the polymer matrix system. In the present study, an attempt was made to make Repaglinide matrix pills released using aloe vera fiber as a release agent. Aloe vera mucilage has been well studied for its use in mammals. On the line the fraction of polysaccharide present in the extraction of Aloe vera finds new information in drug delivery technology. Aloe vera has a history of its use in traditional skin treatments and other diseases that go back thousands of years. Many scientific reports have established beneficial effects on the inner leaf gel and the weight of the high polysaccharides associated with the effects. Possible use of PAG to correct drug withdrawal using different dosages. Finally we can conclude that the modified matrix tablets that use PAG as mucilage can be used as a barrier to the release of matrix tablets for further release.

MATERIAL AND METHODS

Materials:

1. RPGN, HPMC K4M and HPMC 100M GG, CG and PVP, Magnesium stearate (MS) Talc Lactose was obtained.
   100 tablets of Repaglinide were obtained

- Drug excipient compatibility studies were conducted.
- The pure drug and its physical mixtures were subjected to IR spectral studies using FTIR spectrophotometer in the wave number region from 4000 cm-1 to 400 cm-1. The spectra obtained for pure drug and the physical mixtures were compared.
- Evaluation studies.
- Drug Content (Assay).
- Kinetic analysis of dissolution data.
- Stability studies.
- Compatibility studies

2. Extraction of aloevera mucilage: Aloe vera mucilage extraction was done by a series of process.
   - Aloevera fresh plant leaves were collected and washed with water to remove dirt and debris.
   - Incisions to be made on leaves and soaked in water for 5-6 hrs, and boiled for 30 mins and allowed to stand for 1hr for release of mucilage in water.
   - The material was then squeezed from cloth to remove marc from the solution.
   - Three volumes of acetone were added to the filtrate to precipitate the mucilage.
   - The mucilage was separated and dried in an oven at a temperature of <50 degree celcius.
   - Dried powder was passed through No. 80 sieve and to be storedindessiccator for further use. The mucilage was then evaluated for flow properties before tablet compression
   - Flow properties were evaluated.
   - Bulk density was evaluated.
   - Compressibility index

➢ Flow properties of Aloe vera mucilage:

Precompressive parameters of blend (n = 3)

Loose bulk density (g/ml)	Tapped bulk density (g/ml)	Hausners factor	Angle Of repose (°)	Carr's index (%)
0.46±0.05	0.59±0.02	1.282±0.14	23.35±0.01	13.34±1.80
0.45±0.05	0.57±0.03	1.268±0.12	20.48±0.02	12.41±1.40
0.43±0.04	0.55±0.05	1.279±0.21	24.44±0.02	15.99±1.56
0.41±0.04	0.54±0.01	1.317±0.14	22.36±0.06	12.32±0.88
0.41±0.03	0.54±0.04	1.317±0.22	21.91±0.03	14.54±1.48

Parameter	Value
Angle of repose	22.5±0.32
Loose bulk density(g/cm^3)	0.72±0.07
Tapped bulk density(g/cm^3)	0.86±0.06
Carr's index	13.27±0.19
Hausner's factor	1.191±0.02

3. Preparation of matrix tablets: Different tablet formulations to be prepared using different drug: polymer ratio viz,1:1,1:2,1:3,1:4,1:5.

Preparation of matrix tablets containing varying ratios of PAG

Ingredients	Formulation Code				
	PAG1 (mg)	PAG2 (mg)	PAG3 (mg)	PAG4 (mg)	PAG5 (mg)
Repaglanide	10	10	10	10	10
PAG	15	30	45	60	75
Microcrystalline cellulose	171	156	141	126	111
Magnesium stearate	4	4	4	4	4
Isopropyl alcohol	Q.S	Q.S	Q.S	Q.S	Q.S

4. Evaluation of powder blend.
5. Evaluation of tablets Thickness.
6. Weight variation test.
7. Hardness and friability.
8. Drug content.
9. Swelling characteristics.
10. In vitro release studies.
11. Kinetic release profile.
12. Accelerated stability studies

FTIR Studies: The FT-IR spectrum of pure drug (Repaglinide) and its physical mixture with different grade of polymers and excipients is as shown in figure 1& 2 and illustrates the compatibility of drug with excipients.

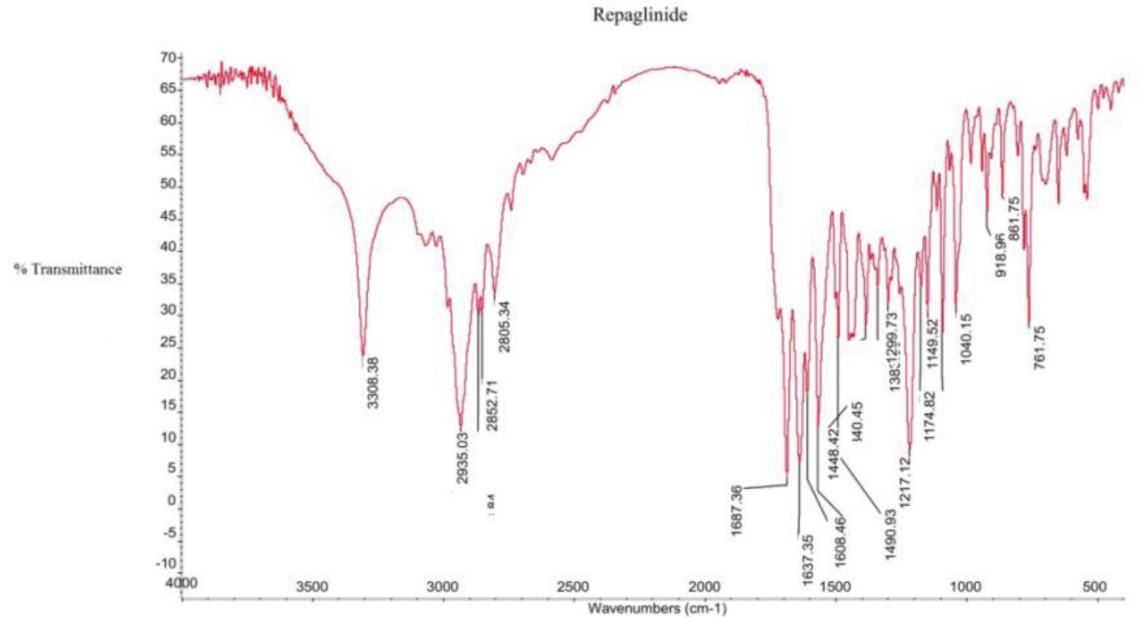

Figure 1: FT-IR spectrum of Pure Repaglinide

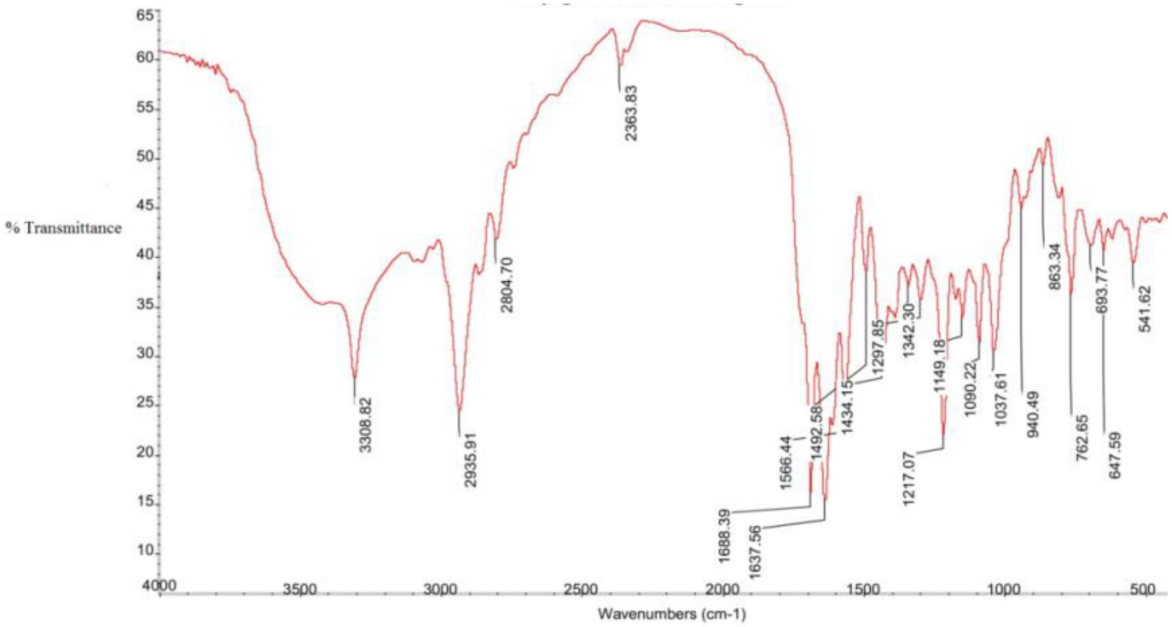

Figure 2: FT IR Spectrum of Repaglinide + PAG

SUMMARY AND CONCLUSION:

Diabetes Mellitus is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to

many of the body's systems, especially the nerves and blood vessels.

Glinides, a new class of short acting insulin secretagogues act directly on the pancreatic beta cell to stimulate rapid insulin secretion Repaglinide is the first oral agent of the meglitinide class to become available for the treatment of type 2 diabetes. One of the many advantages of Repaglinide is that it is one of the few oral agents that can be used in chronic renal failure. The greatest disadvantage of Repaglinide is that it has a very short elimination half-life (1 h) hence it is challenge in development of oral controlled release drug is not just to sustain the drug release but also to prolong the presence of the dosage form within the gastrointestinal tract until all the drug is completely released at the desired period of time.

Aloevera is known for many health benefits including wound healing, antifungal activity, hypoglycemic or antidiabetic effects anti-inflammatory, anticancer, immunomodulatory and gastroprotective properties. Recently is has been discovered that both the A. vera gel and whole leaf extract have the ability to improve the bioavailability of co-administered vitamins in human subjects. Hence the aim of this study to develop and evaluate sustained release matrix tablets of repaglinide using processed aloe Vera mucilage as release modifier.

Different tablet formulations were prepared using different drug: polymer ratio viz, 1:1, 1:2, 1:3, 1:4, 1:5. dry powdered mucilage extracted from A. vera leaves was evaluated for angle of repose, LBD, TBD, Carr's index, and Hausner's ratio. The flow properties of the powder blend was also determined. The results of angle of repose (<30) indicate good flow properties of the granules. Compressibility index values in our result showed excellent flow properties. Tablets with different formulation codes were subjected to various evaluation tests, such as thickness, hardness, friability, and uniformity of drug content. All the formulations showed uniform thickness (CV <0.5%), uniform weight with little significance difference (P > 0.1) were observed with varying formulation code.The percentage friability for all the tablet formulations was below 1%. Drug content was found to be uniform among different batches.It was observed that swelling index increased with time but later on it decreased.The kinetics data obtained from the studies reveals that formulations follow zero-order release kinetics and the rate of drug release is independent of concentration.

Our results clearly indicate the possible use of PAG for modulating the drug release by using in varying ratios. From the above studies, we can finally conclude that the prepared matrix tablets using PAG as mucilage can be used as a release retardant in the formulation of sustained release matrix tablets.

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