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Formulation and Evaluation of Matrix Tablets of Antidiabetic Drug Repaglinde Using Natural Polymers

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ABSTRACT

The oral route is the most frequently used route for the administration of drugs. Many of the pharmaceutical dosage form are formulated as sustained release dosage form to retard the release of a therapeutic agent such that its appearance in the systemic circulation is prolonged and its plasma profile is sustained in duration. Matrix tablets are the most popular method of oral drug administration, and polymeric materials have been used broadly in matrix formulations to modify and modulate drug release rate. Matrix tablets may be formulated by wet granulation or direct compression methods by dispersing solid particles within a porous matrix formed of hydrophilic and hydrophobic polymers. The principal goal of sustained release forms is the improvement of drug therapy assessed by the relationship between advantages and disadvantages of the use of sustained release system. This research paper contained basic information of matrix type of sustained release drug delivery system.

INTRODUCTION

A drug is a substance compound that is utilized to treat, fix, forestall, or analyze a sickness, as well as to further develop prosperity. It is otherwise called a prescription or medication. [1] before, meds were removed from therapeutic plants, however more as of late, they were additionally made naturally. [2] Over constant diseases, drug meds might be utilized incidentally or for a drawn out timeframe. [3] Pharmaceutical medications are much of the time sorted into drug classes, which are assortments of related meds with tantamount synthetic synthesis, a similar system of activity (restricting to a similar organic objective), a practically identical method of activity, and similar sickness for which they are planned to be utilized. [4,5] The expression "drug" alludes to any compound or drug item expected for human or veterinary utilize that means to change or research physiological frameworks or obsessive circumstances to support the collector (WHO). Medication, medication, and drug item are phrases that are here and there utilized reciprocally. The compound part of a drug known as an Active Pharmaceutical Ingredient (API) gives it its remedial activity. A few medications have numerous dynamic fixings (mix item). [6]

Drug delivery system

By directing the rate, timing, and area of medication discharge in the body, a medication conveyance framework (DDS) allows the entry of a remedial material into the body and upgrades its viability and wellbeing. This technique involves controlling the helpful item, having the item discharge the dynamic synthetic substances, and afterward having the dynamic mixtures travel through the natural layers to the site of activity. A medication conveyance framework fills in as a conductor between a patient and a prescription. It very well may be a drug plan that is directed for restorative purposes or a conveyance framework for the medication. This distinction between a medication and a gadget is vital on the grounds that it fills in as the norm for the medication control specialists' administrative oversight of the conveyance strategy. [7] A gadget is firmly controlled as a gadget in the event that it is embedded into the body of a person for a reason other than drug organization, for example, restorative effect through an actual methodology, or on the other hand assuming a prescription is incorporated into the gadget to forestall issues happening from the gadget. The qualification among drugs and gadgets is wide, and every circumstance will decide if it has a place in either bunch. [8]

Oral drug delivery system

Due to benefits including simplicity of oral medication organization, patient decision, cost viability, and straightforwardness of delivering oral dose structures on a wide scale, oral medication is the most well-known technique for drug organization. The oral method of organization is utilized to control around 60% of laid out little atom restorative items that are financially open. As per current gauges, the overall piece of the pie for everything drug plans intended for human use is held by oral details to a level of generally 90%. Orally surrendered drugs make around 84% of the top-selling meds, which are by and by esteemed at $35 billion and developing at a 10% yearly speed. [9] For the restricted therapy of neurotic circumstances like stomach and colorectal tumors, contaminations, irritations, entrail sicknesses, gastro-duodenal ulcers, and gastroesophageal reflux issues, orally managed prescriptions can likewise be coordinated to explicit regions inside the gastrointestinal (GI) parcel. [10]

Strategies to Improve Oral Drug Delivery

Comprehension of impediments is essential for the advancement of oral plans for medications with low water solvency. A critical calculate the restricted oral bioavailability of hydrophobic meds is drug solvency. [11] Food influence, gastrointestinal inconvenience, slow start of activity, absence of measurement proportionality, critical intra-and between subject changeability, and drowsy beginning of activity are extra factors related with restricted bioavailability of hydrophobic medications.[12] Other techniques, such miniature/nanonization, can likewise fundamentally expand a medication's bioavailability. [13] Pharmaceuticals' molecule size is essentially diminished utilizing these methodologies, which improves their surface region and, thusly, the dissolving rate. [14]

Matrix tablets

The most famous solid gadget for managing medicine discharge is a network type oral controlled-drug conveyance framework. They were very easy to make in contrast with different gadgets, and there was no gamble of accidental measurement unloading similarly as with supply gadgets. These gadgets scatter and pack the dynamic fixing inside the polymer network. The underlying medication focus in the lattice, the medication's dissolvability, the presence of water-solvent added substances, the wetting of the medication, the porosity, convolution, and the polymer framework making the network all

influence how the medication sets free from solid gadgets. [15-17] As tablets are the most reasonable technique for ceaseless and managed discharge strong portion, grid tablets are a possible system for the presentation of expanded discharge medicine treatment. The "oral strong dose structures in which the drug or dynamic fixing is homogeneously spread all through the hydrophilic or hydrophobic lattices what capabilities as delivery rate retardants" is the thing network tablets are, as per one definition. [18] These frameworks use dissemination and disintegration-controlled techniques to deliver the drug consistently. Most of the measurements in the tablet is delivered by one of two separate delivery processes, either zero-request disintegration and diminishing surface region or dissolving of covered particles, but the all out tablet discharge profile consolidating the two techniques in progression is essentially direct. [19]

Matrix system

Dynamic and idle parts are consistently consolidated and spread in the measurement structure to make a lattice framework. The prevalence of the network frameworks, which are by a long shot the most generally utilized oral controlled discharge innovation, might be connected to various factors that will be shrouded in the following segment. [20,21] Fick's most memorable law of dispersion oversees the delivery from framework type definitions. Q is the amount diffused per unit of time t, D is the dissemination coefficient, and J is the motion, or rate, of dissemination. [22]

Drug Release from Matrix systems

The medication is at first broken up in the washing arrangement uncovered external layer prior to diffusing out of the lattice. The contact between the washing liquid and the strong drug is as yet crawling internal during this system. Accordingly, for this framework to be dissemination managed, the pace of medication molecule disintegration inside the lattice should be considerably faster than the pace of medication disintegration outside the network. [23,24]

MATERIAL AND METHOD

Pre-formulation of Drug

The majority of pre-formulation studies yield data that is useful for developing reliable dosage frames that can be supplied in large quantities for product.

Determination of Melting Point of Repaglinide

Repaglinide's ability to liquefy was managed by a limited technique that used a dissolving point mechanical assembly.

Determination of partition co-efficient of Repaglinide

It was determined by soaking 10 ml of n-octanol in 10 ml of 0.1 N HCL for 24 hours. 10 mg of medicine added to an isolation pipe and middle of the road shaking were successfully countered for 4 hours. Measure of the drug that dissolved at each step was resolved at 248 nm against transparent layers of solvent that were separated through a pipe.

Solubility study of Repaglinide

Repaglinide's dissolvability in methanol, ethanol, propanol, butanol, propylene glycol, and water were resolved. Every vial holding 1 ml of dissolved was added with a generous dose of repaglinide. To promote proper drug mixing, the blend was combined with sonication. Blend was agitated in a rotating orbital shaker for 72 hours at 400.5°C (REMI, Mumbai.). After then, the blend was left alone for 24 hours to attain equilibrium. The additional mixture was centrifuged at 3000 rpm for 15 minutes before being filtered using Whattman filter paper. Filtrates were diluted with 0.1 N HCL and UV Spectrophotometry at 231 nm was used to quantify them.

Preparation of Calibration Curve for Repaglinide

A stock solution containing 1000 g/ml of rasagiline was produced in order to create the calibration curve. This (standard stock) was made by precisely weighing 100 mg of rasagiline on a digital balance and then transferring that amount into a 100 ml volumetric flask that had already been cleaned and dried. This conical flask was placed in the sonicator while a little amount of 0.1N HCl was injected to dissolve the rasagiline. In order to get the volume up to the mark, further 0.1N HCl was added. To eliminate particles, Whatman filter paper was used to filter this solution. The creation of a workable standard solution was then accomplished using this solution.

Formulation of Granules

The bulk was first run through sieve No. 12 (nominal mesh aperture size 1.4 mm and approximate sieving area 44) to produce the granules, which were then heated to 50°C in a

hot air oven to dry. The nominal mesh aperture size of sieve No. 22 is 710 m, and its estimated screening area is 37. Dried granules went through this sieve. Repaglinide granules were created using the hot melt granulation technique. Pharmaceutical powders are effectively agglomerated using the fluidized hot melt granulation technique by using a low melting point binder that is added to the powder's other ingredients. The binder functions as a granulating liquid when it is molten.

EVALUATION OF PREPARED GRANULES OF TABLETS (Precompression)

The generated powder mixes' micromeritic characteristics were assessed using the following criteria to see if they were suitable for direct compression. These tests are conducted in triplicate, and the mean results are shown.

Angle of repose

The greatest angle between a pile of powder's surface and the horizontal plane is known as the angle of repose. The fixed funnel and free standing cone methods were used to calculate the angle of repose of the powder mixture. The flow property is improved with a lower angle of repose. A powder funnel was fastened at a specific height (h) above the graph paper that was positioned on a flat, horizontal surface, with the end of the stem perpendicular to its axis of symmetry. The funnel's height was set such that the peak of the conical pile barely brushed the tip when the weighed amount of powder mixture was carefully poured through it. Using the Equation presented below, the radius (r) of the pile's base was computed, and the tangent angle of repose was as well. The comparison between flow property and angle of repose is shown in the table below.[25]

$$\text{Tan } \theta = h/r$$

Where, ‘h’ and ‘r’ are the height and radius of the powder cone.

Table No. 1 Angle of repose (º)

Angle of repose (º)	**Flow behaviour**
25-30	Excellent
31-35	GOOD
36-40	FAIR
41-45	PASSABLE
46-55	Poor
56-65	Very poor
>66	Very very poor

Bulk density and tapped density

The mass of the powder divided by the volume taken up by the loose powder bed is known as the bulk density of a powder. The powder sample was contained in a container that was mechanically tapped to enhance the bulk density, which is known as the tapped density. The ratio of the powder's mass to its volume after a specific number of taps is known as the "tapped density." The powder's tapped density depicts its haphazardly thick packing.

It was established if the bulk density was untapped or tapped. 100 g (w) of a powder mixture that had been precisely weighed was added to a 250 ml measuring cylinder, and the powder was gently levelled without being compacted. Volume ought to be larger than or equal to 60% of the cylinder's overall volume. The closest graded unit was used to record the starting volume (V0). Equation was used to determine bulk density. The sample was then put on the tapped density tester (Model C-TDA2, Campbell Electronics, Mumbai, India) and tested using the USP-I 118 technique, which involves 500 taps at 300 drops per minute with a 142 mm drop height. After 500 taps, the powder bed's volume (Vt) was measured. Additional 750 times of tapping were performed, and the loudness was recorded as (Vb). Because the difference in volume between the two was less than 2%, Vb was regarded as tapped volume. Equation below was used to compute tapped density: [26,27]

$$\text{Bulk density} = \frac{Mass\ of\ the\ powder\ (w)}{Bulk\ volume\ of\ the\ powder\ (Vo)}$$

$$\text{Tapped density} = \frac{Mass\ of\ the\ powder\ (w)}{Tapped\ volume\ of\ the\ powder\ (Vb)}$$

Hausner's ratio

The ratio of the tapped density to the bulk density is used to calculate it. The following list includes the limitations for Hausner's ratio. It is calculated with the formula shown in the equation below:[28]

$$\text{Hausner's Ratio} = \frac{Tapped\ density}{Bulk\ density}$$

Table No. 2 Hausner's Ratio

Hausner's Ratio	**Flow behaviour**
1.00-1.11	Excellent
1.12-1.18	GOOD
1.19-1.25	FAIR
1.26-1.34	PASSABLE
1.35-1.45	Poor
1.46-1.59	Very poor
>1.60	Very very poor

Compressibility index or Carr's index (CI)

An essential measurement that may be derived from the bulk and tapped densities is the compressibility index. Theoretically, less compressible materials flow more easily. A material with values under 20% has good flow characteristics. In order to compute it, use the equation provided below:[29]

$$\text{Compressibility index} = \frac{Tapped\ density - Bulk\ density}{Tapped\ density}$$

Table No. 3 Compressibility index (%)

Compressibility index (%)	**Flow behaviour**
<10	Excellent
11-15	GOOD
16-20	FAIR
21-25	PASSABLE
26-31	Poor
32-37	Very poor
>38	Very very poor

Preparation of matrix tablets of Anti-diabetic drug Repaglinide

Repaglinide matrix tablets were made by combining the materials that had already been put through sieve No. 100, enough to make a batch of 200 tablets that were weighed in accordance with the calculations in the table below. The medication and polymer (xanthan gum) were geometrically combined until the mixture was homogeneous. Repaglinide was melted in a ceramic dish over a water bath for three minutes at 75°C. Progressive additions of polymers were made while stirring to ensure even mixing. While being stirred, the molten fluid was allowed to gently cool before solidifying. The substance that had hardened was broken up in a mortar and sent through a sieve number 22. Granules were then lubricated for three minutes in a polybag with talc and magnesium stearate. After adding glidants, the flow characteristics of the granules were assessed using the angle of repose. All granules produced using various polymers had favourable flow characteristics. Thus, the final mix was squeezed into tablets using 8 mm or 10 mm round flat punches and a 16-station rotary punching machine (M/s. Cadmach Machinery Co. Pvt. Ltd., India) to achieve a hardness of 4 to 5 kg/cm^{20}.

Table No. 4 Formulation Chart of Matrix Tablets

Ingredients	Mt-1	Mt-2	Mt-3	Mt-4	Mt-5
Repaglinide	100	100	100	100	100
Xanthan gum	20	25	25	20	20
Methanol	5	10	5	10	5
Lactose monohydrate	15	20	20	15	20
Magnesium stearate	3.5	4	3.5	4	3.5
Talc	2	3	2	2	3
Distilled water	10	10	10	10	10

EVALUATION OF PREPARED MATRIX TABLETS (Post-compression)

The produced tablets were examined for quality control purposes, including testing for hardness, thickness, friability, and drug content (assay).

Hardness

The force required to shatter a tablet is used to determine the tablet's hardness in a polar pressure test, which is also known as the "devastating strength test." Kg/cm2 units are used to assess hardness. A tablet had been placed between two iron blocks. Two iron blocks were placed under strain in order to determine the ferocious force that caused the tablet to break. The tablet's strength in crushing comes from its hardness. Using a Monsanto hardness tester, the hardness of five tablets that were randomly chosen was determined.

Figure No. 1 Monsanto hardness tester

Thickness

Protecting a consistent tablet size required a certain level of tablet thickness. Vernier calipers were used to measure the thickness of the five tablets that were randomly chosen. The average and standard deviation were computed.

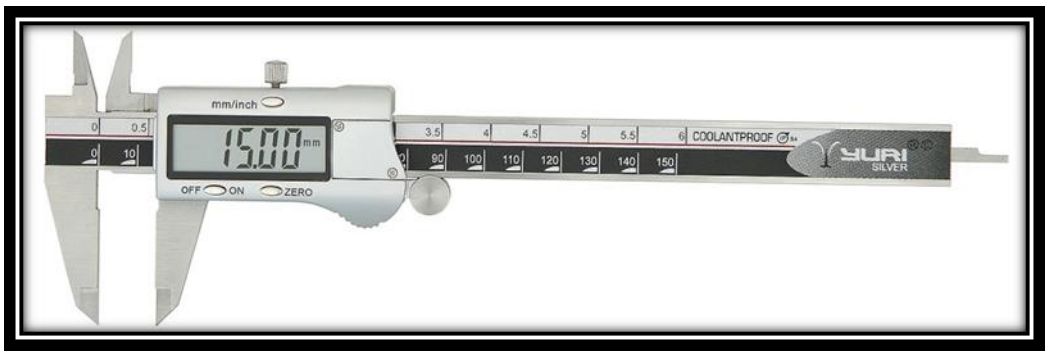

Figure No. 2 Vernier calipers

Weight variation test

The uniformity of weight test for tablets was performed by weighing and calculating the individual weights of 20 tablets that were chosen at random from a batch of tablets. Compared the weight of a common tablet to the loads of individual tablets.

% weight variation = Average weight – Individual weight/ Average weight ×100

Friability

The objective of this test is to ascertain the physical toughness of compressed tablets. The Roche friabilator was used to conduct the friability test. The tablets weighing 6.5 g were chosen at random, and their starting weight (wo) was recorded and placed in a revolving drum. Then, 100 falls of 6 inches in height were inflicted upon them (25 rpm for four minutes). The pills were powdered and precisely weighed when rotation was complete (w). Unless the findings were difficult to interpret or the weight loss was larger, the test was only performed once. In those cases, the test was repeated twice, and the mean of the three tests was calculated. Weight reduction of no more than 1.0% of body weight is allowed. Equation presented below was used to compute the percent weight loss or friability (f):

$$F = (1- \frac{W}{Wo}) \times 100$$

Figure No. 3 Roche friabilator

Estimation of drug content

10 tablets were randomly selected from each batch, each one was ground in a glass mortar to a fine powder, and then the resulting powder—equivalent to 50 mg of Repaglinide—was added to a 50 mL volumetric flask. The drug was extracted using 25 mL of methanol with vigorous shaking on a mechanical shaker for 1 hour, filtered through a 0.45 m Millipore nylon filter disc into a 50 mL volumetric flask, and the filtrate was diluted to the desired strength using methanol. Using a UV visible spectrophotometer, further suitable dilutions were created with pH 6.8 buffer, and the absorbance at 276 nm was evaluated against a blank prepared under the same circumstances without the medication.

RESULTS

Pre-formulation study of Repaglinide:

Organoleptic properties:

- **Appearance:** a mixture of white powder that never ends.
- **Odour:** odourless
- **Taste:** Bitter flavour

- **Texture:** Fluffy

Melting Point:

Melting points for repaglinide (API) were found to be 175°C, 174°C, and 176°C. The reported melting point of repaglinide was 175–178 oC. Thus, experimental values and standard values accord the most.

Solubility study of Repaglinide:

Table No. 5 Solubility of Repaglinide in different solvents

S.no.	Solvent	Property
1.	Methanol	Freely soluble
2.	Benzene	Freely soluble
3.	Ethanol	Slightly Soluble
4.	Chloroform	Soluble
5.	Acetone	Freely soluble
6.	Water	Insoluble

Partition coefficient:

The partition coefficient (P) for repaglinide was found to be 3.45. The partition coefficient for Repaglinide was 3.45. Therefore, there is the greatest agreement between experimental and standard data.

Preparation of Calibration Curve for Repaglinide

Using a 0–50 g/mL concentration of Repaglinide in methanol, alignment bend for Repaglinide was obtained. At 237 nm, absorbance was observed. The table below shows the absorption obtained for the indicated fixations. Alignment bending shows relapse in the equation Y = 0.0175x & R^2 = 0. 9995. Results showed that medicine concentrations between 0 and 55 g/ml follow Beer Lambert's rule since the relapse coefficient was zero. 9995.

Table No. 6 Calibration curve of Repaglinide

Sr. No	Concentration (µg/ml)	Absorbance Mean(±SD)
1.	0	0
2.	15	0.214 ± 0.002
3.	25	0.345 ± 0.005
4.	35	0.555 ±0.003
5.	45	0.795 ±0.005
6.	55	0.902 ±0.007

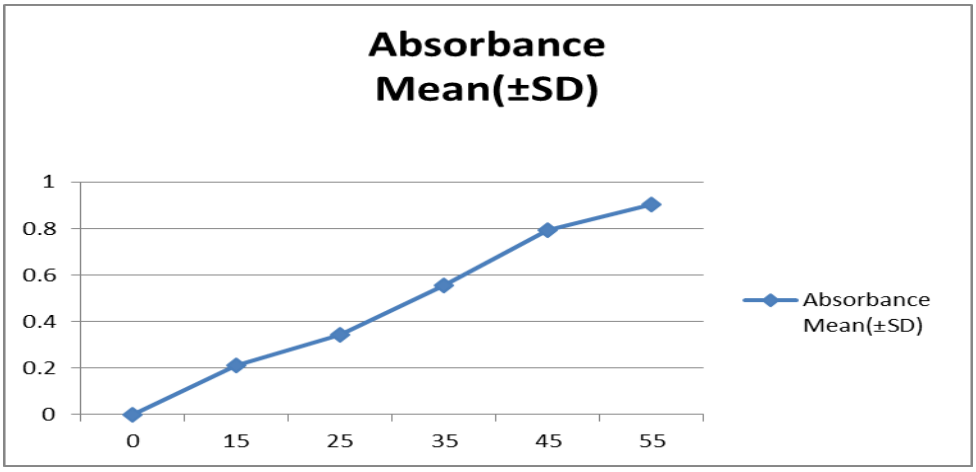

Figure No. 4 Repaglinide Calibration curve

Table No. 7 Parameters of Repaglinide

Sl. No.	Parameters	Repaglinide
1.	Wavelength (λmax)	237 nm
2.	Beer's limit (µg/mL)	0-55
3.	Corrélation coefficient (R^2)	0.9995
4.	Slope	0.0175

Identification of Repaglinide by FT-IR Spectroscopy

On a hydraulic pellet press, a potassium bromide IR plate was prepared using 1 mg of repaglinide, and it was studied in the region of 4000-400 cm-1. The collected IR spectrum was compared with repaglinide's reference range. The IR spectra of pure repaglinide exhibits the peaks below. The peaks listed below can be regarded as repaglinide-specific peaks.

Table No. 8 FTIR spectrum of Repaglinide

Bond (stretching)	Wave number (cm-1)
-NH	3345.95
-OH	2925.34
-CH	2635.17

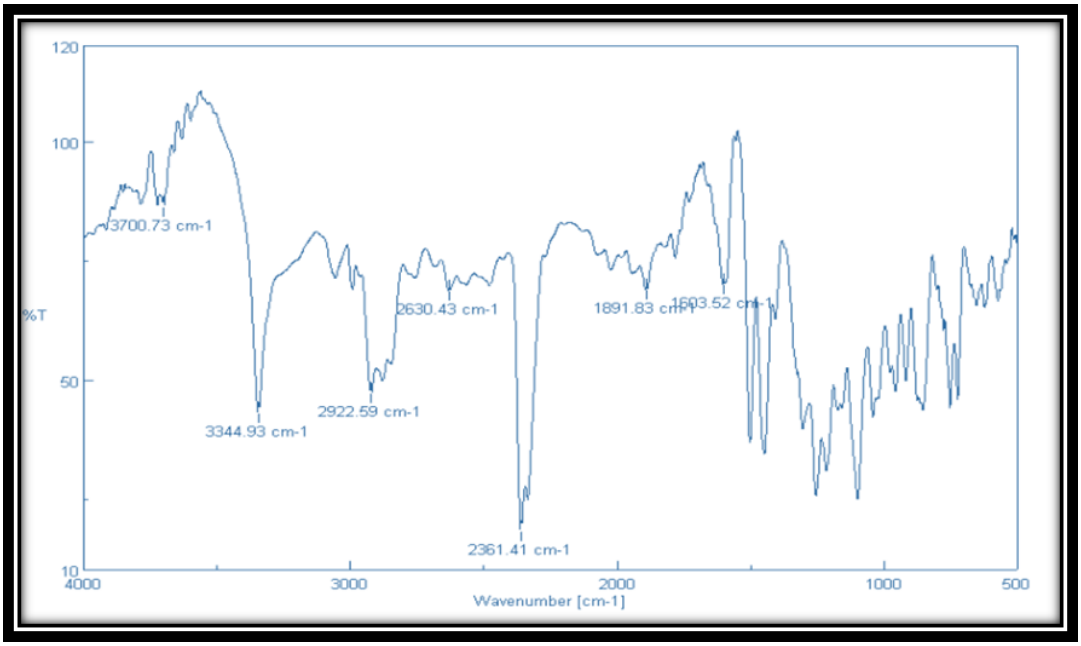

Figure No. 5 IR spectrum of Repaglinide

EVALUATION OF GRANULATIONS

Granulation, which involves the continuous release of a medication from coated or matrix type particles, is the important step in the creation of numerous dosage forms. An accumulation of separate particles linked together by bonds with a limited strength is referred to as a granule. Although matrix tablets might have been produced using a direct compression technique, wet granulation (non-aqueous) is preferable in typical commercial

manufacturing to achieve adequate content homogeneity and eliminate flow-related inter-tablet weight fluctuation process. The present investigation consequently employed the wet granulation process. Drugs incorporated in a heterogeneous formulation can dissolve at different rates depending on the physical features of the granules, such as size, shape, hardness, surface characteristics, and specific surface area. Angle of repose, loose bulk density (LBD), tapped bulk density (TBD), and Hausner's ratio were all measured in the granules of two distinct medication formulations (HF).

The table below provides the results of the micromeritic parameters of the precompression Granules. Angles of repose ranged from 23.7 to 33.8°C, while the compressibility index ranged from 6.06 to 12.76. The range of the Hausner's ratio for all formulations was 1.05 to 1.25. All of these numbers showed that the powder blends had excellent to good flow characteristics.

Table No. 9 Evaluation of granulations

Evaluation Parameters	Bulk density (g/cc)	Hausner`s ratio	Tapped density (g/cc)
Mt-1	0.31	1.12	0.35
Mt-2	0.41	1.07	0.44
Mt-3	0.42	1.09	0.46
Mt-4	0.46	1.06	0.49
Mt-5	0.44	1.09	0.48

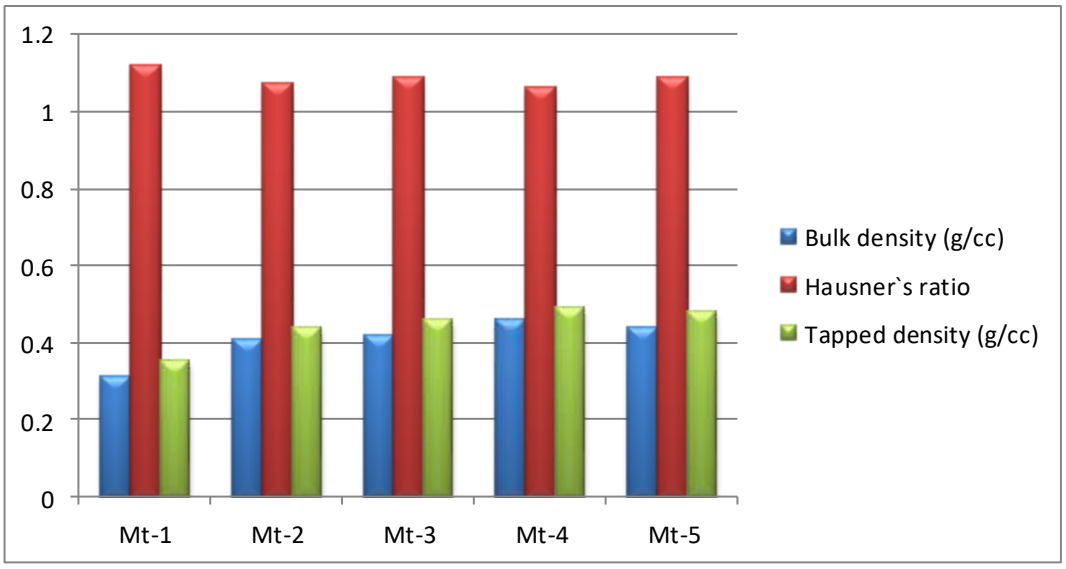

Figure No. 6 Graph of Evaluation of granulations

Table No. 10 Evaluation of granulations

Evaluation Parameters	Compressibility Index (CI) (%)	Angle of repose (θ°)
Mt-1	7.14	33.8
Mt-2	10.21	24.7
Mt-3	6.09	24.5
Mt-4	8.64	23.7
Mt-5	7.15	25.7

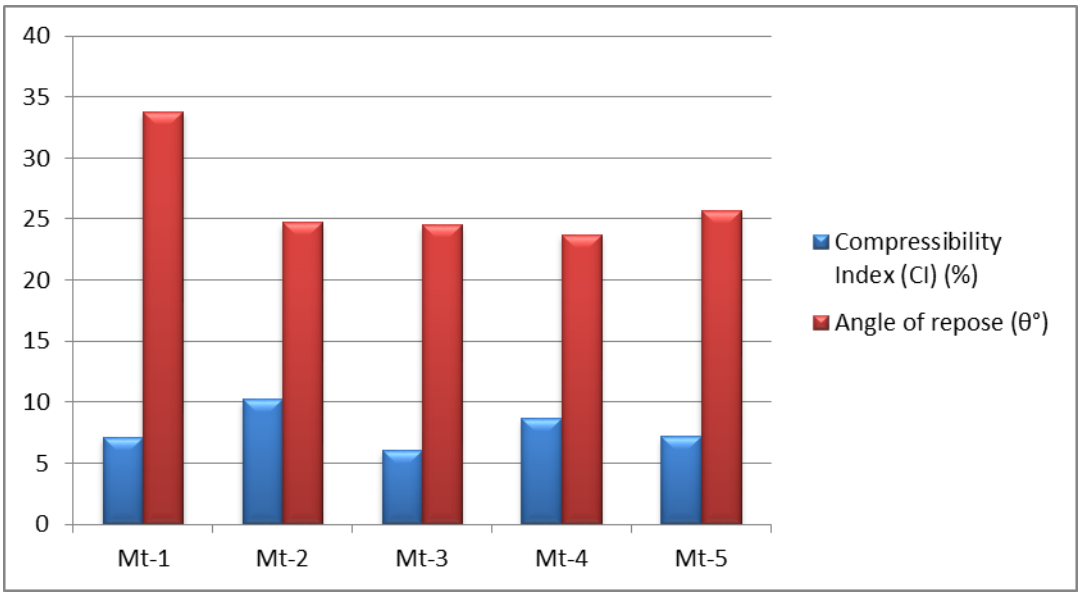

Figure No. 7 Graph of Evaluation of granulations

Weight Uniformity

The physical and chemical properties of matrix tablets made by direct compression, such as weight homogeneity, were assessed. The weight uniformity met the pharmacopoeial acceptable standard of 5.0%.

Table No. 11 Weight uniformity data of Mt-1 to Mt-5 matrix tablets.

Sr. No	Formulation code	Average weight (mg)
1.	Mt-1	20.25
2.	Mt-2	20.45
3.	Mt-3	21.82
4.	Mt-4	22.36
5.	Mt-5	21.92

mean value of n = 3

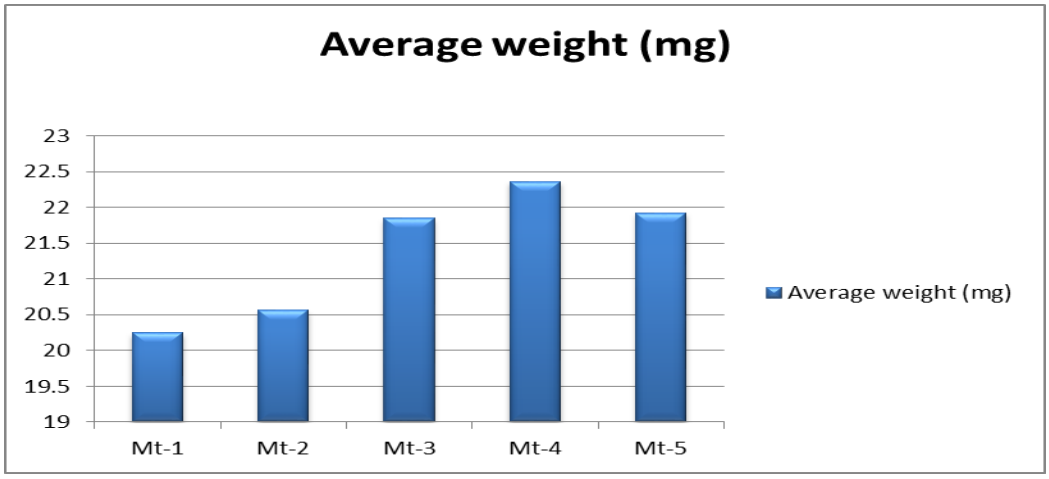

Figure No. 8 Graph of weight uniformity data of Mt-1 to Mt-5 matrix tablets.

Determination of Parameters of drug (post-compression studies)

By sliding the screw knob forward, the force acting on the edge of the matrix tablets is steadily raised until the tablet breaks. The scale's reading, which expresses the amount of pressure needed to shatter tablets in kilogrammes per square metre, is reported. A friabilator was filled with a pre-weighed sample of tablets, and it was rotated 100 times. creation of tablets containing Repaglinide matrix. Repaglinide matrix tablets were created by combining several polymers in varying quantities. For Repaglinide, the physical characteristics of several batches of produced matrix tablets are provided. By calculating the average weight, thickness, drug content, hardness, and friability of the produced tablets, these qualities were investigated.

Table No. 12 Characteristics of matrix tablets of Repaglinide

Evaluation Parameters	Hardness Range	Friability (%)	Drug Content(%)
Mt-1	4-5	0.37	94.15
Mt-2	4-5	0.27	95.26
Mt-3	4-5	0.28	96.84
Mt-4	4-5	0.41	93.35
Mt-5	4-5	0.38	96.24

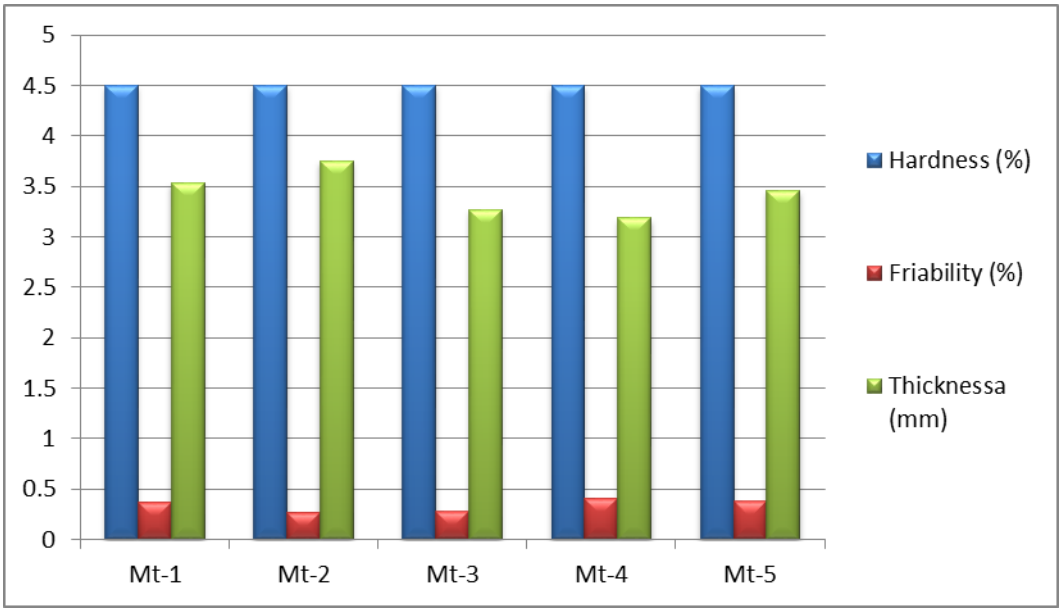

Figure No. 9 Graph of Characteristics of matrix tablets of Repaglinide

Table No. 13 Characteristics of matrix tablets of Repaglinide

Evaluation Parameters	Thickness (mm)	Uniformity of weight (mg)
Mt-1	3.54	151.25
Mt-2	3.75	135.64
Mt-3	3.27	136.45
Mt-4	3.19	140.25
Mt-5	3.46	145.76

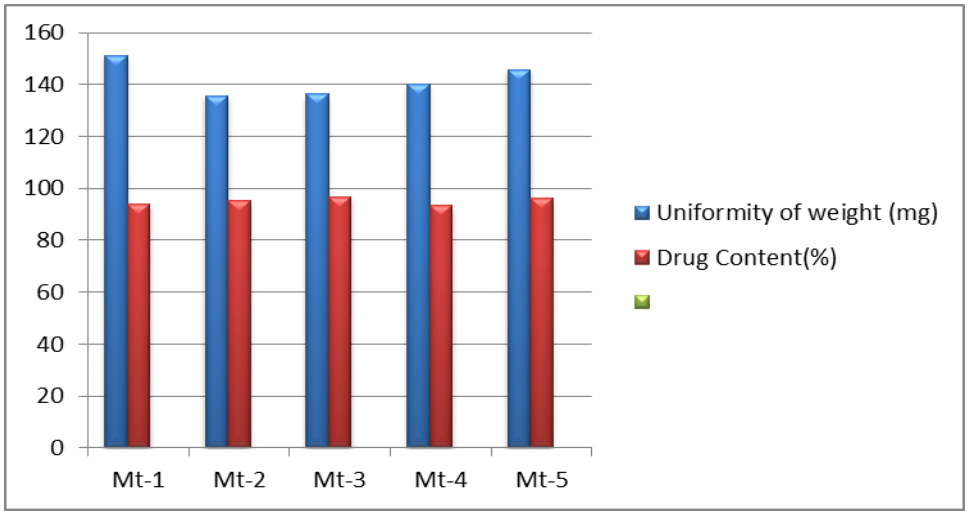

Figure No. 10 Graph of Characteristics of matrix tablets of Repaglinide

Table No. 14 Evaluation parameters of batch which was kept for stability study:

Evaluation Parameters	Hardness (%)	Friability (%)
Before stability Storage	Ranged From 4-5	0.34
After 1 month Storage	Ranged From 4-5	0.42
After 2 month Storage	Ranged From 4-5	0.35
After 3 month Storage	Ranged From 4-5	0.40

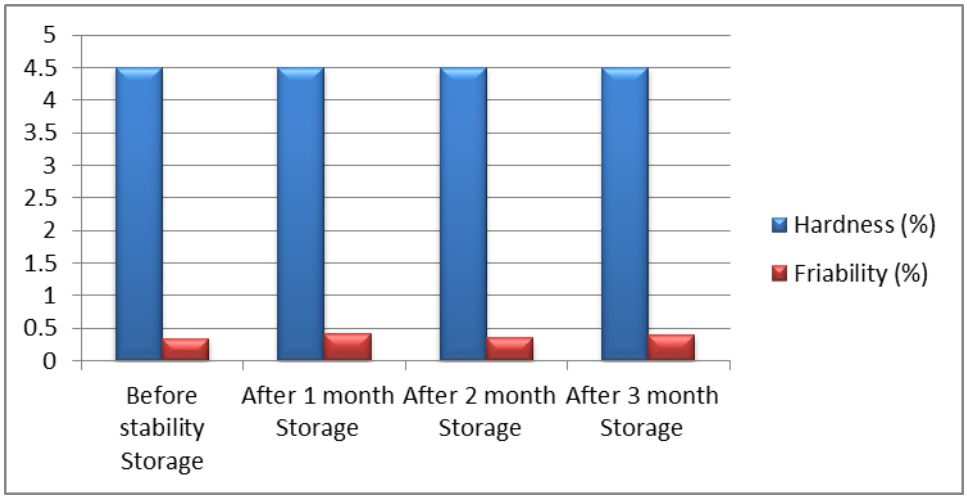

Figure No. 11 Graph of Evaluation parameters

CONCLUSION

The most popular and economical method of medicine administration is oral administration. It is also the most convenient. Because gastrointestinal (GI) physiology allows for greater dose flexibility from design than other routes, it is a commonly employed route Repaglinide has the following organoleptic characteristics: off-endlessly white powder, odourlessness, bitter taste, and fluffy in texture. Melting points for repaglinide (API) were found to be 175°C, 174°C, and 176°C. The reported melting point of repaglinide was 175–178 ºC. Compared to other solvents, methanol provided the best solubility. Angles of repose ranged from 23.7 to 33.8°, while the compressibility index ranged from 6.06 to 12.76. The range of the Hausner ratio for all formulations was 1.05 to 1.25. The weight uniformity met the pharmacopoeial acceptable standard of 5.0%. The Repaglinide matrix tablets ranged in hardness from 4-5. Repaglinide matrix tablet friability varied from 0.25 to.45. Repaglinide matrix tablets had a drug content that varied from 0.25 to.45. The examined parameters before and after the formulations had been aged in storage did not significantly differ from one another; all were found to be within acceptable bounds.

Future scope of the study

Studies on chronic toxicity must be looked at in order to determine its long-term use. To investigate the use of Matrix Tablets in various pharmacological dosage forms.

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Conflict of interest

The Authors declare no conflict of interest.

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