

Formulation and Evaluation of Nutraceutical Tablet using Herbal Remedies by Direct Compression Method

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Abstract: *The objective of present work was to formulate and evaluate the nutraceutical tablets with different combination of herbal remedies. The combination of nutrition and pharmaceuticals i.e nutraceutical. fenugreek seeds and Annona squamosa Leaves. contribute to treat diabetes disease. It is used as antidiabetic agent. The nutraceutical tablet containing lactose and mannitol as diluent and containing natural drugs like seeds and Annona squamosa Leaves .which was tablet prepared by direct compression method. The compressed formulations were subject to several evaluation parameters like appearance, thickness, weight variation, hardness and friability. Results: The results of all evaluation parameters of nutraceutical tablet were within the acceptable limit. Pre-compression studies of nutraceutical tablet show satisfactory results. The thickness, hardness, weight variation, and friability of nutraceutical tablet were found to in acceptable range. Significant results were obtained from present study. Discussion: The obtaining of current investigation clearly found that the health promotion of the body could be done by nutraceuticals.*

Keywords: Direct compression, Nutraceutical, antidiabetic

I. INTRODUCTION

Introduction:-the combination of nutrition and pharmaceuticals i.e nutraceutical. The oral route has been one of the most popular routes of drug delivery due to its ease of administration, patient compliance, least sterility constraints and flexible design of dosage forms. Tablet are defined as unit dose, it is a solid preparations containing one or more active ingredients. Conventional drug delivery systems like tablets and capsules often dissolve rapidly in the gastrointestinal tract for absorption into the bloodstream give rise to inordinately high drug concentrations in plasma. The concept of making utility of food as health promoting factor beyond its nutritional value is getting acceptance with in public arena and among scientific community. Nutraceuticals contain health- supporting ingredients or natural components that have an ability health benefit for the body. A „nutraceutical“ is a product isolated or purified from foods that is generally sold in medicinal forms not usually connected with food. A nutraceutical is bearing to have a physiological benefit or give protection against chronic disease. It works in to two ways that is to minimize diseases symptoms or to improve body performance. The Fenugreek seeds and Annona squamosa Leaves contain the ability to treat diabetes Nutraceuticals sometimes referred as “functional foods”, have caused heated debate because they change the traditional dividing line between food, and medicine. A nutraceuticals is “any non-toxic food component that has scientifically proven health benefits, including disease treatment or prevention.” The functional component of the food must be evaluated in the nutraceutical product and generate under good manufacturing practices (GMPs). Increased public demand, trends in demography, socio-economic scenario. Various benefits of nutraceuticals are may help us live long time, may increase the health assets of our diet, help us to abstain particular medical condition, it have a psychological advantage from doing something for one self, and maybe sensed to be more “natural” than traditional medicine and less likely to produce unpleasant side-effects. The nutraceuticals normally contain required amount of lipids, protein, carbohydrates, vitamins, minerals and other necessary nutrients depending upon their emphases.

Nutraceuticals in the market contains both traditional foods and non-traditional. When a supplement tablet is ingested, the body must digest and absorb the nutrients. The major physiological role of are its fenugreek seeds and Annona

squamosa Leaves antimicrobial, anticancer, antioxidant, antidiabetic, cholesterol lowering, anti-inflammatory and its potential role in prevent diabetic diseases. fenugreek seeds major free amino acid, 4-hydroxyisoleucine, stimulates insulin secretion from perfused pancreas in vitro. The Annona squamosa Leaves contain the ability to α - amylase inhibition. its helpful for treat diabetic.

II. MATERIAL AND METHODS

Fenugreek seeds and Annona squamosa Leaves. were collected from the local market .all other ingredient such as mannitol, magnesium stearate and talc were get in college. Nutraceutical tablets containing fenugreek seeds and Annona squamosa Leaves powders were prepared by direct compression method. Other ingredients like lactose was used as diluent, magnesium stearate as lubricant and talc as glidant. All the excipients along with API weighed as shown in Table 1 and passed through sieve no. 20. Then, all ingredients were mixed following geometric mixing excluding glidant and lubricant thoroughly for 15min. The powder blend was thoroughly mixed with talc and magnesium stearate and compressed into a 400mg tablet using single rotatory punching machine. Table no. 1

Ingredients	F1	F2	F3	F4
Fenugreek seeds	100	-	100	-
Annona squamosa Leaves	-	100	-	100
Lactose	290	290	-	-
Mannitol	-	-	290	290
Sodium saccharine	2	2	2	2
Talc	4	4	4	4
Magnesium sterate	4	4	4	4

Evaluation of Nutraceutical Tablets

Pre-compressional studies of powder blend In development of new dosage form preformulation study is the prior step in the potential drug development. It is the principal investigation in the drug development to obtained information on the known properties of compound and the proposed development schedule. So, this preformulation investigation may nerely confirm that there are no significant barriers to compound development.

Following pre-compressional parameters were studied like angle of repose, bulk density, tapped density, compressibility indices etc.

Angle of repose

It is the maximum angle that can be obtained between the heap of powder and the horizontal plane. It was determined by using fixed funnel method. Specified amount of powder drug was transfer to the funnel keeping the orifice of the funnel blocked by thumb. When powder was cleared from funnel then measured its angle of repose and measured in θ .

$$\text{Angle of repose } (\theta) = \tan^{-1}h/r$$

Bulk density

It is the ratio of bulk mass of powder to the bulk volume. It is denoted by ρ_b . Bulk density is used to find out homogeneity.

$$\text{Bulk density } (\rho_b) = M/V_b$$

Where, M is the mass of the sample, V_b bulk volume

Tapped density

It is the ratio of the weight of powder to the minimum volume occupied in measuring cylinder. Tapped density determined by placing a graduated cylinder containing a known mass of drug or formulation on a mechanical tapper apparatus which is operated at fixed no. of taps (1000) until the powder bed reached a minimum volume.

$$\text{Tapped density } (\rho_t) = \text{weight of powder blend} / \text{Minimum volume occupied by cylinder}$$

Compressibility Indices**Carr's index**

Based on the apparent bulk density and the tapped density, the percentage compressibility of the powder mixture was determined by the following formula.

$$\text{Carr's index} = \frac{\text{Tapped density} - \text{Bulk density}}{\text{Tapped Density}} \times 100$$

Hausner's ratio

It is an indirect index of ease of measuring of powder flow. Lower Hausner's ratio (<1.25) indicates better flow properties than higher ones (>1.25)

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

Post-compressional studies of prepared nutraceutical tablets

The nutraceutical tablets were evaluated for various parameters after consideration of preformulation to overcome errors during formulation preparation. These are like appearance, thickness, weight variation, hardness and friability. All the evaluation parameters of all formulations are given following tables.

Physical appearance

The general appearance of tablet was studied visually in shape, color, texture and odour.

Thickness

The tablet thickness was calculated by Vernier calipers. Tablet was put in between two jaws vertically and measured thickness and 6 tablets were used for this test and expressed in mm. Weight variation test is run by weighing 20 tablets individually, calculating the average weight and comparing individual tablet weight to the average. The weight variation test would be a satisfactory method of determining the drug content uniformity of tablets.

Hardness

Hardness also termed as tablet crushing strength. The tablet hardness was determined by Monsanto hardness tester. The tablet was placed lengthwise between upper and lower plunger and force applied by turning a threaded bolt until the tablet fractures and measured hardness of tablet in Kg/cm²

Friability

It is determined by Roche friabilator, subjects a number of tablets to combined effects of abrasion and shock by utilising a plastic chamber that revolves at 25 rpm, dropping tablet from inches distance operated for 100 revolutions. Preweighed tablets were dusted and re-weighed and according to standard limit friability should be less than 1%. It is calculated by formula- % Friability = $\frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$

In vitro drug release

The 4-hydroxyisoleucine, stimulates insulin secretion through the Fenugreek seeds it shows therapeutic effect on diabetic diseases

The α -amylase inhibition through the Annona squamosa Leaves it also helps for the treatment of diabetic diseases.

III. RESULTS AND DISCUSSION

The nutraceutical tablet of Fenugreek seeds and Annona squamosa Leaves nutraceutical tablet was formulated by direct compression method. This technique was used for conventional from nutraceutical tablet which minimize processing steps and eliminated wetting and drying process. It contains activity. The physicochemical properties show satisfactory results by nutraceutical tablet which are within the range of prescribed standards required for investigation of present study

Table 1.

Precompression parameters	F1	F2	F3	F4
Angle of repose	23.16	26.18	28.12	22.58
Bulk density	0.4612	0.4816	0.4416	0.4212
Tapped density	0.4261	0.4272	0.4488	0.4682
Carr's index	14.16	13.58	14.06	14.58
Hausner's ratio	1.18	1.14	1.16	1.12

Table 2.

Post compression Parameter	F1	F2	F3	F4
Thickness	1.2	1.2	1.2	1.2
Hardness	5.6	4.9	4.6	5.26
Weight variation	0.396	0.398	0.398	0.397
Friability	0.22	0.22	0.24	0.18
In vitro drug release	89.26	84.88	86.84	84.72

Table 3

Physical evaluation	F1	F2	F3	F4
Shape	Round	Round	Round	Round
Colour	Cremish	Whitish green	Cremish	Whitish green
Texture	Smooth	Smooth	Smooth	Smooth
Odour	Characteristics	Characteristics	Characteristics	Characteristics

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