

“Formulation And Evaluation Of Nutraceutical Tablet Of Polyherbal Drugs By Wet Granulation”

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Abstract

Introduction: The current study's goal was to Develop and Test Nutraceutical Tablets containing various herbal drug combinations.

Material and Method : The Nutraceuticals tablet contains Magnesium Stearate and Aerosol as lubricants, HPMC as a binder, and natural drugs such as Guduchi, Amla, Aloe Vera, and Brahmi that were prepared using the Wet Granulation Method. Several Evaluation parameters, including Appearance, Thickness, Weight Variation, Hardness and Friability, and HPTLC Analysis, were applied to the compressed formulations. All of the Nutraceutical tablet evaluation parameters yielded acceptable results. Pre-compression studies on nutraceutical tablets yield positive results. Nutraceutical tablet thickness, hardness, weight variation, and friability were found to be within acceptable limits. The current study yielded significant results of the HPTLC study yielded a satisfactory acceptable result. Based on the findings, HPTLC Fingerprint analysis carries out with a methanol extract of all the herbs with solvent system Chloroform : Methanol : EthylAcetate : Glacial Acetic Acid (6:2:2:0:2) usingCAMAG HPTLC system.

Result : From the HPTLC study it is found that the extract and tablet sample is showing good peak and photo capture at the 254nm ,366nm.. the individual drug & tablet formulation were study for the quantitative estimation it was concluded that the tablet contains an adequate amount of herbal drug.It was clearly found in the current investigation that nutraceuticals might be used to support bodily health. These and other nutricosmetics rich in nutrients and antioxidants may be used to treat and prevent a wide range of illnesses that can benefit from vitamin and antioxidant content. There are well establishment done in the improvement and role of basic nutrient which maintains quality of life , wellness although nutraceuticals have significant role in promoting human health , stronger immune system , prevention of the human disorder., nutrition specialist have to work strategically to provide ultimate health benefits .

Conclusions : Herbal's have an different kind of scope in medicinal benefits from immemorial period there is extensive use of the varioius herb is done for the immunity and prevention of the diseases.

KEYWORDS : Nutraceuticals, Giloy, Brahmi, Functional Food, Wet Granulation, HPTLC.

INTRODUCTION :-

Because of its ease of Administration, Patience Compliance, and most suitable dosage forms, The oral route is one of the most popular drug delivery systems. Traditional dosage forms, such as tablets and capsules, rapidly dissolve in blood and are rapidly absorbed, resulting in a significant increase in plasma concentrations. [1]. The concept of using food as a health-promoting factor in addition to its nutritional value is gaining traction in the public and scientific arenas. Nutraceuticals contain health-promoting ingredients or natural components that have the potential to benefit the body's health. [2]

A Nutraceutical is a substance extracted from foods that is typically sold in medicinal forms that are unrelated to food. A nutraceutical is a substance that has a physiological benefit or provides protection against chronic disease. Dr. Stephen L. Defelice, Founder and Chairman of the Foundation for Innovation in Medicine in New Jersey, USA, proposed this magical term. Ntraceuticals, also known as "Functional Foods," have sparked debate because they blur the traditional line between food and medicine. [3] .Nutraceuticalsare Nontoxic food substances that have been shown to have scientifically proven health benefits. In the production and standardisation of nutraceutical products, good manufacturing processes are primarily used [4].

Traditional treatments food's medical benefits have been studied for thousands of years. During the 1980s, Japan saw the birth of a modern Nutraceutical Industry. Nutraceuticals may help us live longer lives, improve the health of our diets, help us avoid certain medical conditions, have a psychological benefit from doing something for oneself, And may be perceived as more "Natural" than traditional medicine and less likely to produce unpleasant side-effects. [3, 5] Many more subcategories are found under the main heading Nutraceuticals, such as Vitamin, Lipid, Carbohydrate, Fibre, Traditional, Minerals, and so on.

Nutraceuticals are available in both traditional and non-traditional forms in the indian market. Many studies show that when a Nutraceutical tablet is administered into the body, The tablets are digested first, and then all nutrients are absorbed [5]. Because of the growing disapproval of synthetic drugs among people due to their toxicological profiles, the dietary supplement health and education act was established in 1954. [5, 6]Nutraceuticals primarily work in two ways: to reduce disease symptoms or to boost the body's immunity. The central idea the purpose of using nutraceuticals is to improve functional benefits. [2, 3]

The nutraceutical tablet contains Guduchi, Brahmi, Amla, Aloe vera, and Punarnava, all of which have different therapeutic properties.

Guduchi has Anti-Diabetic properties, Brahmi improves memory, and Aloe vera is the Richest source of vitamins and minerals. It is also used to treat Spasms, Heart Disease, Cancer, Hypertension, and Diabetes are the major diseases with which nutraceuticals have been associated for prevention or treatment.[15,16].

MATERIALS AND METHOD : -

Ashwin enterprise provided guduchi, brahmi, aloe vera, and pumarnava. All other ingredients, including HPMC, Magnesium Stearate, and Aerosil, were obtained from CABOT SANMAR in MUMBAI. all ingredients were of analytical grade.[14]

Method: -

A. Preparation of Powder Blend:-

1.) For Preparation of Granules:-

- a. Initially, aloe vera and brahmi pieces are pulverised into fine powder. Take the total amount of drugs in the formula, which is 480 mg. The 48 mg blend was taken and placed in another tray.
- b. In a separate beaker, combine 15 mg accurately weighted hpmc with 50 ml isopropyl alcohol and 100 ml distilled water to form a paste.
- c. Slowly add the HPMC slurry to the remaining 432 mg blend and prepare the dump mass.[38,...,44]
- d. Finally, the dump mass is passed through sieve no. 16 to form granules before being placed in a hot air oven at 70°f for 1 hour. Pass through sieve no. 20 once more. To obtain the required size of granules.

B. Preparation of Nutraceuticals Tablet: -

- a. In a separate beaker, combine the remaining 48 mg powder blend with the lubricant (mag stearate and aerosil) and thoroughly mix it.
- b. Add the 48 mg powder blend to the previously prepared powder blend and mix for 15 minutes.
- c. Finally, The tablet was prepared using a rotary tablet punching machine and a 10 mm punch.

No	Ingredients	A batch	B batch	C batch
1	Guduchi	170 mg	170 mg	170 mg
2	Brahmi	100 mg	110 mg	110 mg
3	Amla	50 mg	60 mg	50 mg
4	Aloe vera	30 mg	20 mg	20 mg
5	Punarnava	130 mg	110 mg	130 mg
6	HPMC	15 mg	12 mg	17 mg
7	Mag stearate	2.5 mg	4 mg	1.5 mg
8	Aerosol	2.5 mg	4 mg	1.5 mg

“Table1: Formulation batches of nutraceuticals tablet = 500mg”

Evaluation of Nutraceutical Tablets:-

➤ Pre- Compressional Studies of Powder Blend

Pre formulation study is the first step in potential drug development when developing a new dosage form. It is the primary investigation in drug development to obtain information on known compound properties and the proposed development schedule. As a result, this pre-formulation investigation may nearly confirm that no significant barriers to compound development exist. angle of repose, bulk density, tapped density, compressibility indices, and other pre-compressional parameters [45] were studied, and the results are shown in the table. 2

1) Angle of repose :-

It is the greatest possible angle between the freestanding surface of the powder heap and the horizontal plane. The fixed funnel method was used to determine it. A specific amount of powder drug was transferred to the funnel while the orifice of the funnel was blocked with the thumb. When the powder was removed from the funnel, the angle of repose was measured and recorded in [7.]

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

2) Bulk Density :-

It is the ratio of powder bulk mass to powder bulk volume. It is represented by the letter B. To determine homogeneity, bulk density is used. $b = \text{bulk density (m/vb)}$

Where m is the sample's mass and vb is the bulk volume.

3) Tapped Density :-

It is the weight of the powder divided by the minimum volume of the measuring cylinder. A graduated cylinder containing a known mass of drug or formulation is placed on a mechanical tapper apparatus, which is operated at a fixed number of taps (1000) until the powder bed reaches a minimum volume. [8]

Tapped density (ρ_t) = Weight of powder blend/minimum volume occupied by cylinder

4) Carr's index :-

The percentage compressibility of the powder mixture was calculated using the following formula based on the apparent bulk density and the tapped density. Carr's index = $\frac{\text{tapped density} - \text{bulk density}}{\text{tapped density}} \times 100$

5) Hausner's Ratio :-

It is an indirect measure of the ease with which powder flow can be measured. Lowering the hauser's ratio (1.25) indicates better flow properties than increasing it (>1.25). [10]

$$\text{Hauser's ratio} = \frac{\text{tapped density}}{\text{bulk density}} \quad [7, 8]$$

➤ Post-Compressional Studies of Prepared Nutraceutical Tablets:-

To overcome faults during formulation production, the nutraceutical tablets were assessed for several criteria after considering preformulation. these include factors like as appearance, thickness, weight fluctuation, hardness, and friability. Table 3 contains all of the assessment parameters for all formulations.

1) Physical Appearance :-

The overall look of the tablet was studied visually in terms of form, colour, texture, and odour.

2) Thickness :-

Venire callipers were used to determine the thickness of the tablet. the tablet was placed vertically between two jaws and the thickness was measured in millimeters. six tablets were used for this test. 8

3) Weight variation test :-

The weight variation test is performed by individually weighing 20 tablets, computing the average weight, and comparing each tablet weight to the average. The weight variation test would be an acceptable way of assessing tablet medication content consistency.

4) Hardness :-

Tablet crushing strength is another name for hardness. The Monsanto Hardness Tester was used to determine the hardness of the tablet. The tablet was placed lengthwise between the upper and lower plungers, and force was applied by turning a threaded bolt until the tablet fractured, at which point the hardness of the tablet was measured in kg/cm² [7, 8].

5) Friability :-

It is determined by the rochefriabilator, which subjects a number of tablets to the combined effects of abrasion and shock by utilising a plastic chamber that revolves at 25 rpm, dropping tablet from inches distance for 100 revolutions. Pre-Weighed tablets were dusted and re-weighed, and friability should be less than 1% according to established limits.

It is calculated by formula- % friability = $\frac{\text{initial weight} - \text{final weight}}{\text{initial weight}} \times 100$

6) Stability study:-

Stability testing was performed on formulation b. 40° c/ 75% rh was studied. tablets' physical appearance, hardness, and disintegration time were investigated.

The outcomes are shown in the table. 4

❖ **High Performance Thin layer Chromatography Finger-print Analysis Study:-**

Samples Preparations:-

A. Giloy :-

Weigh correctly 247.3 mg of material and combine with 25 ml methanol in the rbf for 1 hour. Repeat for another half hour using 10 ml of methanol allow filtering through whatman filter paper to collect the filtrate, which evaporates at 97 degrees celsius and is recrystallized with methanol. The HPTLC technique is used for quantitative and qualitative estimation.[32]

B. Amla :-

Weigh precisely 100.3 mg of sample and mix it into the rbf with 25 ml of methanol and initially reflux for 1 hour. Repeat for another half hour using 10 ml of methanol allow filtering through whatman filter paper to collect the filtrate, which evaporates at 97 degrees celsius and is recrystallized with methanol. The HPTLC technique is used for quantitative and qualitative estimation. (tiill here i hve completed)

C. Brahmi :-

Weigh an exact 200 mg sample into the rbf, mix with 25 ml of methanol, and first reflux for 1 hour. Repeat for another half hour. Using 10 ml of methanol allow filtering through whatman filter paper to collect the filtrate, which evaporates at 97 degrees celsius and is recrystallized with methanol. The HPTLC method is used for quantitative and qualitative estimation.

D. Aloe vera:-

Precise weight 0.06 mg sample was placed in the rbf mix with 25 ml methanol and initially refluxed for 1 hour. Repeat for another half hour. Using 10 ml of methanol allow filtering through whatman filter paper to collect the filtrate, which evaporates at 97 degrees celsius and is recrystallized with methanol. The HPTLC technique is used for quantitative and qualitative estimation.

E. Punarnava:-

Precise weight 0.260 mg sample, mixed with 25 ml methanol in the rbf, and initially refluxed for 1 hour. Repeat for another half hour. Using 10 ml of methanol allow filtering through whatman filter paper to collect the filtrate,

which evaporates at 97 degrees celsius and is recrystallized with methanol. theHPTLC method is used for quantitative and qualitative estimation.

F. Tablets: -

Two tablets are taken from the optimised batch b and crushed before being added to the rbf and refluxed with methanol for one hour. It should be filtered and recrystallized with methanol. The HPTLC method is used for quantitative and qualitative estimation.[34]

RESULTS:

Guduchinutraceutical tablets were created using the wet granulation process. This approach was utilised to create standard nutraceutical tablets with fewer processing stages. The physiochemical properties of nutraceutical tablets show satisfactory results that are within the range of prescribed standards required for the investigation of the current study. [7]

Pre- Compression Studies of Powder Blend:-

Table 2 shows the results of testing the powder mix for various criteria. angle of repose, bulk density, tapped density, carr's index, and hauser's ratio were determined to be adequate assessment metrics. The study of pre formulation characteristics revealed that there is no moisture in power and that the powder blend is consistent 11. The flow rate analysis concluded that the powder mix has an optimal percentage that results in the highest flow rate. As shown in table 2, the powder has an excellent flowing quality that does not interfere with the tablet punching process.^[7, 10]

No	Parameters	batch A	batch B	batch C
1	Bulk density	0.3030 gm./cc	0.2857 gm./cc	0.2650gm/cc
2	Tapped density	0.3225 gm./cc	0.3125 gm./cc	0.3150 gm./cc
3	Carr's index	6.04 %	8.5 %	15.87 %
5	Angle of repose	15.94 °c	20 °c	22 °c

No	Parameters	Formulation Batch B	
		Zero Month	One month
1	Colour	light brownish	light brownish
2	Odor	-	-
3	Texture	Smooth	Smooth
4	Hardness	3 kg/cm ²	3 kg/cm ²
5	Disintegration Time	3 minutes	4 minutes

“Table 2 : Pre compressional study”

Post-Compression Study:-

Table 3 displays the results of several physical characteristics such as tablet thickness, hardness, weight fluctuation, and friability, as well as stability research data. 4. The inclusion of active medicinal components, filler, binder, and lubricant provides appropriate volume to the tablet, reducing danger during punching. Nutraceuticals tablet thickness, hardness, weight variation, and friability were found to be within acceptable limits. It demonstrates that the disintegration profile of herbal drugs containing nutraceuticals tablets is satisfactory due to their hardness being within the standard limit

No	Parameter	batch A	batch B	batch C
1	Hardness	3.5 kg/cm ²	3 kg/cm ²	5.1 kg/cm ²
2	Friability	0.098 %	0.00%	0.0767%
3	Weight Variation Test	0.513 mg	0.503 mg	0.490 mg
4	Diameter	12.4 mm	12.4 mm	12.4 mm
5	Thickness	3.64 mm	3.64 mm	3.75 mm
6	Disintegration Time	5 min	3 min	9 min

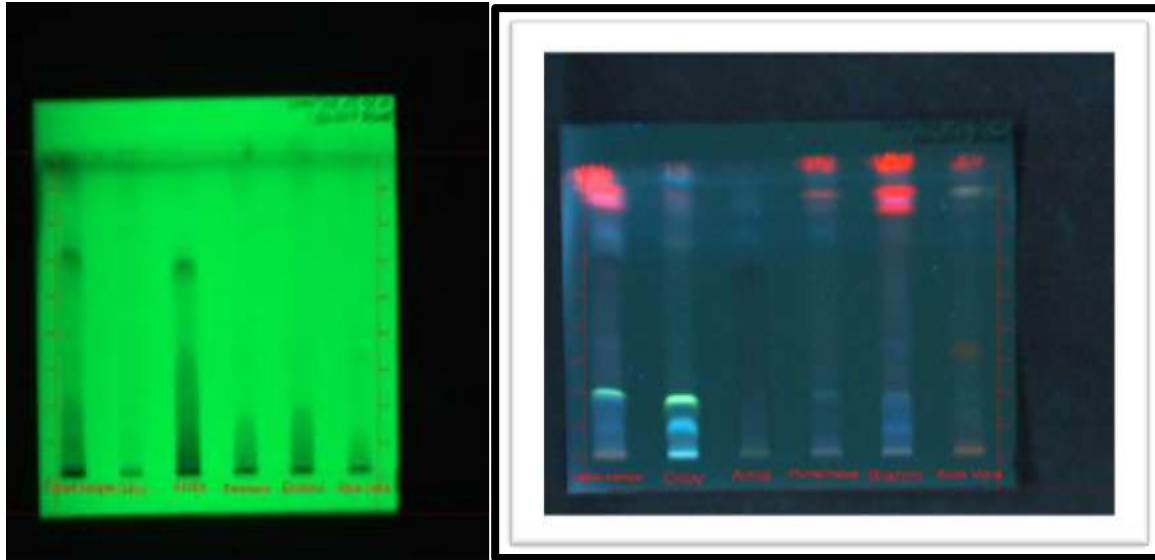
“Table 3:- Post Compressional Study”

“Table 4: Stability study data”

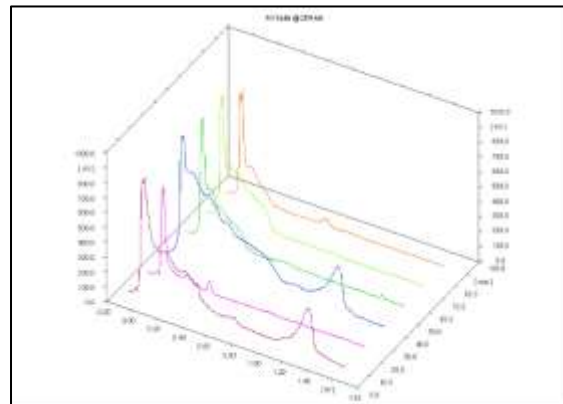
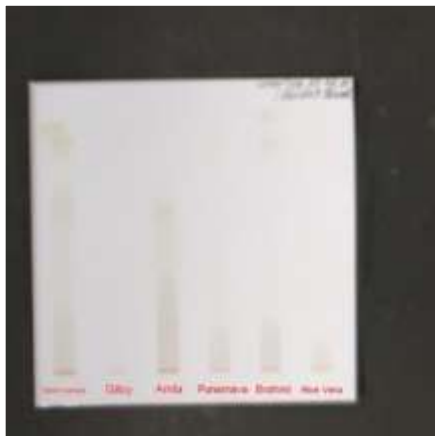
HPTLC Result for Nutraceuticals Tablet:-



“Fig 1: HPTLC Extract”



“Fig 2 -Photo after development at 254 nm”“Fig 3 – Photo after development at 366 nm”



“Fig 4- Photo after development at day light ““Fig 5 – 3d display”

DISCUSSION/CONCLUSION :-

Fingerprint analysis of the methanol extract of herbs:-

The CAMAGHPTLCsystem sprays with vanillin sulphuric acid reagent after a methanolic extract of all herbs with solvent system chl3: ch3oh: ea: gaa (6:2:2:0.2)

is used for fingerprint analysis.

Giloy exhibits fluorescence activity,

As shown in figure 3.[50]

- Based on the findings of this investigation, we conclude that the nutraceutical tablets were made using the wet granulation method and produced adequate and acceptable results. The formulations containing guduchi, brahmi, and amla are more beneficial. Based on the findings of the preceding research, it was concluded that herbal nutraceutical tablet prepared in the form of cost effective tablet to minimise patients compliance in terms of suppressing side effects and enhancing positive effects on the body. Based on the findings, we determined that the formulation including guduchi has an anti-hyperglycemic impact, brahmi acts as a memory enhancer, and amla is the best source of vitamins and minerals. Nutraceuticals like these, which are high in nutrients and antioxidants, can be used to treat and prevent a variety of ailments containing vitamins and antioxidants because they are indigenous nutraceuticals, they can also be cost effective.

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