Nat. Volatiles & Essent. Oils, 2021; 8(6): 6377-6383

NVEO
Natural Volatiles & Essential Oils

Formulation And Evaluation Of Polyherbal Tablet For Better Therapeutic Efficacy

Dr. Santosh Kumar Mahapatra[1], Seema Verma[2]*

1. Institute of Pharmacy and Technology, Salipur, Cuttack.
2. Royal College of Pharmacy, Raipur, Chhattisgarh.
Corresponding Author-Seema Verma

Abstract

It was intended to developed and evaluate polyherbal tablet consisting dry powder of aqueous extract of Tinospora cordifolia,Annona squamosa,Withaniasomnifera,and Azadirachta indica.The aqueous extract of Tinospora cordifolia,Annona squamosa,Withaniasomnifera,and Azadirachta indicawere formulated. The direct compression approach was used to create all six distinct pills (HF1 to HF6) in the batch. The mixtures were tested for their flow qualities and their compressibility, and the results showed that they were successful in both categories. A single rotatory punching machine was utilised throughout the production of the tablets. After that, the compressed tablets were put through a variety of different physical tests, including evaluations of their diameter, thickness, weight variability, variation in hardness, friability, in vitro disintegration time, and in vitro dissolution. The outcomes of each of these tests came back as positive, which is a good sign.

Keywords: Polyherbal tablet, direct compression,in vitro disintegration time, in vitro dissolution.

Introduction

The administration of medications through the orally path is the method that is recommended the greatest commonly to have a systemic impact. Tablets are the largest common oral formulation that can be purchased on the consumer markets and are utilised by individuals as well as medical professionals[1]. The parenteral route is only recommended by physicians in a very limited number of circumstances. There are limitations to the capabilities of the topical mode of administration to provide effective drug absorption for systemic pharmacological action. When it comes to providing systemic effects, the oral route is chosen the vast majority of the time. Oral administration was the method of choice for the administration of polyherbal formulations as well. It is well knowledge that herbal remedies present a lower risk of adverse effects than their allopathic counterparts[2].

Plants that have the ability to treat illness are always an admirable source of medicine. The medicinal plants that are sold in stores obtained their active ingredients either immediately or indirectly from the plants themselves. These secondary metabolites, which are abundant in the plant, have been found to have medicinal value, and the herb itself is a rich source of chemical components[3].

The combination of various herbs (polyherbal) in a particular ratio will give a desirable therapeutic effect because the potent phytochemical constituents of individual plants are inadequate to achieve the beneficial effect. The polyherbal formulation contains two or more herbs with different phytoconstituents possessing similar or dissimilar therapeutic potential have been collectively producing desirable effects during the management of human ailments. The popularity of the polyherbal formulation is outstanding because of their wide therapeutic range i.e., effective at a low dose and safe at high dose, though produces fewer side effects whilst misused[4-7].

The current study was planned to formulate novel polyherbal formulation containing Tinospora cordifolia,Annona squamosa,Withaniasomnifera,and Azadirachta indicaand evaluation was conducted in different parameters as mentioned in Pharmacopoeia.

Materials and Methods

The leaves of Annona squamosa and Azadirachta indica, roots of Withaniasomnifera and stems of Tinospora cordifolia were collected, after cleaning plants parts were shade dried. The plant parts were further processed for the coarsely powdered and kept in air tight container for experimental work.

Preparation of extract

The plant powdered of Tinospora cordifolia,Annona squamosa,Withaniasomnifera,and Azadirachta indica were mixed in the proportion of 2:1:1:2, respectively. The 500 gm of mixture were poured in distilled water until the reach of complete exhaustion. Initially, the extract being strained when it was remaining hot, then the liquids subsequently removed using evaporation, and finally, any remaining residues of liquid were eliminated using reduced pressure. After the drying process was complete, the finished powder was placed in an airtight bottle and placed in a cool environment in preparation for further development of polyherbal tablets.

Development of polyherbal tablets

Direct compression was used as the preparation technique for the polyherbal tablets. All of the components for the formulations that are listed in table 1 were measured accurately and then blended using a mortar and a pestle. After that, the powder mixture was given a little opportunity to dry, after which it was thoroughly mixed once more and put via sieve no. 60. The mixture was compacted using a rotary machine with a circular concave shape and a break line on one side of the upper punch. The pressure used was 7-8 tonnes. Both official standards and unofficial tests were carried out on the tablets that had been compacted. Before the compaction took place, the medication and the polymers were subjected to a number of different assays.

Evaluation of tablet blends

Angle of repose

The funnel technique was utilised in order to ascertain the angle of repose of pill mixtures. It was enabled for the mixtures to flow freely via the funnel and out onto the platform. After determining the angle of repose and measuring the diameter of the powder cone, the calculation were used to get the angle.

$$\tan \theta = h/r$$

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

Bulk density

In order to measure the apparent bulk density, a specific amount of tablet mixtures was poured into a graduated cylinder, and both the volume and weight of the cylinder were recorded.

Bulk Density = Mass of powder / Bulk Volume of the powder

Tapped bulk density

To establish it, a graduated cylinder with a known weight of drug-excipient mixture was placed in the appropriate location. The graduated cylinder was dropped onto a hard surface from a height of 10 centimetres at intervals of 2 seconds while being permitted to drop beneath its own weight.

The tapping was carried on until there was no longer any discernible difference in the volume.

Tapped density = Weight of powder / Tapped volume of the powder

Carr’s index

The following is how the compressibility index developed by Carr is defined:

$CI = \rho t - \rho a / \rho t = Va – Vt / Vt$

Where ρt and ρa – tapped and poured bulk density; And Vt and Va – tapped and poured bulk volume respectively.

Hausner’s ratio

The Hausner's ratio was computed by making use of the formula below, and the results were reported as a percentage.

$H=D_t/D_b$

Whereas D_t represented the density of the powder when it was tapped, D_b indicated the density of the powder when it was measured in bulk.

Evaluation of tablets

Thickness

A Vernier calliper was used to measure the thickness of the each pill, 20 pills of each batches were sampled, and the average thickness of all of the tablets was computed.

Uniformity of weight

Every single tablet that makes up a batch should have the same weight, and any deviation from that weight should fall within the acceptable range. A computerised balance was used to make the measurements, and the results were accurate to within 1 mg. A sample of twenty pills was used to determine weight control.

Hardness and friability

The Pfizer hardness tester and the Electro lab friabilator test apparatus were used to evaluate each formulation's 20 tablets in order to assess the tablets' levels of hardness and friability, respectively.

Disintegration time

After inserting all six pills, a plastic disc was placed on top of the tablets and the tubes were sealed. The tablets are subjected to pressure as a result of the disc. In a water medium that was kept at 37 degrees Celsius, the test tubes were given the freedom to move up and down at a rate of 29-32 cycles per minute. The disintegration time of the pill was estimated to be the amount of time needed for all tablets to travel via the mesh[8-10].

In vitro dissolution study

The dissolution profile of a polyherbal tablet was evaluated by utilising the USP dissolution equipment II with 900 ml of 0.1 PBS at 37±0.5 degrees Celsius and a stirring rate of 100 revolutions per minute. The absorbance at a wavelength of 221 nm was measured with the assistance of a UV spectrophotometer after various samples totaling 5 ml were removed and replaced with simulated fluid of the same amount at 1, 2, 4, and 8 hours, respectively. The samples were then filtered through Whatman filter paper before the absorbance was measured[11-13].

Result and Discussion

The direct compression method was utilised in the preparation of all six separate polyherbal tablets.

All of the different physical mixes of aqueous extract were analysed in order to establish their micromeritic characteristics. According to the results of the angle of repose, Carr's Index, and Hausner ratio, the powder combinations have good flow qualities and good packing ability (Table 2).

The physical properties of the pill, including its weight, hardness, drug content, and friability, were analysed, and the results were compared with those of other polyherbal tablets for uniformity. It was observed that the thickness of herbal tablet formulations varied between 4.24 and 5.12 millimetres across the board. All of the formulations' tablet weights were found to be within the limits specified by the USP, which ranged from 285 to 360 mg. The levels of hardness and friability of tablets produced by each batch of herbal tablets were within the permissible ranges. The herbal tablets have a poor friability, which suggests that they are compact and difficult. It was discovered that all of the formulations had a disintegration time that fell somewhere between 10.24 and 11.97 minutes (Table 3). According to the findings of the drug release profile, the formulation HF3 achieves its maximal release of 90.8% after eight hours (Fig. 1).

Conclusion

When the aqueous extract of Annona squamosa, Withaniasomnifera, Tinospora cordifolia, and Azadirachta indica were formed into the form of polyherbal tablets, it was discovered that the formulation produced effective effects. The tablets that were produced had an appropriate level of hardness and a suitable rate of disintegration. The HF3 features a medication release that is both effective and promising. As a result of this investigation, the researchers came to the conclusion that the herbs that were chosen will have a significant impact on the treatment of diabetes. In addition, the pharmacological testing and

clinical procedures that are necessary for the production of herbal medications that are both safe and effective need to be established.

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Table 1: Composition of herbal tablet

Ingredients	HF1	HF2	HF3	HF4	HF5	HF6
Extract	250	250	250	250	250	250
HPMC K 4 M	25	50	100	-	-	-
Ethyl Cellulose	-	-	-	25	50	100
Talc	4	4	4	4	4	4
Magnesium Stearate	6	6	6	6	6	6
Theoretical Weight	285	310	360	285	310	360

Table 2: Evaluation of various blends

Parameters	HF1	HF2	HF3	HF4	HF5	HF6
Angle of repose	24° 18'± 0.12	23° 21'± 0.11	25° 61'± 0.16	25° 59'± 0.24	24° 43'± 0.05	24° 48'± 0.14
Mean Apparent bulk density (g/cm^3)	0.51±0.32	0.48±0.18	0.63±0.23	0.47±0.28	0.53±0.43	0.56±0.11
Mean Tapped bulk density (g/cm^3)	0.61±0.48	0.55±0.62	0.73±0.31	0.58±0.56	0.59±0.19	0.67±0.41

Compressibility Index (%)	16.39	12.72	13.69	18.96	10.16	16.41
Hausner's Ratio	1.19± 0.02	1.14± 0.08	1.15± 0.04	1.23±0.07	1.11±0.05	1.19±0.09

Value shown in tables is mean of three determinations

Table 3: Data of assessment of polyherbal tablets

Parameters	HF1	HF2	HF3	HF4	HF5	HF6
Uniformity of weight (mg)	285.34±0.57	310.52±0.45	360.71±0.83	285.56±0.67	310.27±0.37	360.12±0.54
Thickness (mm)	4.35±0.17	4.98±0.24	5.12±0.12	4.24±0.68	4.71±0.46	4.86±0.51
Friability (%)	0.28±0.57	0.33±0.48	0.27±0.92	0.25±0.15	0.41±0.36	0.32±0.29
Tablet Hardness (Kp)	5.47±0.35	5.62±0.21	5.93±0.49	5.32±0.39	5.69±0.87	5.82±0.41
Disintegration time (min)	10.24±0.63	11.05±0.35	11.67±0.21	10.87±0.82	11.65±0.64	11.97±0.52

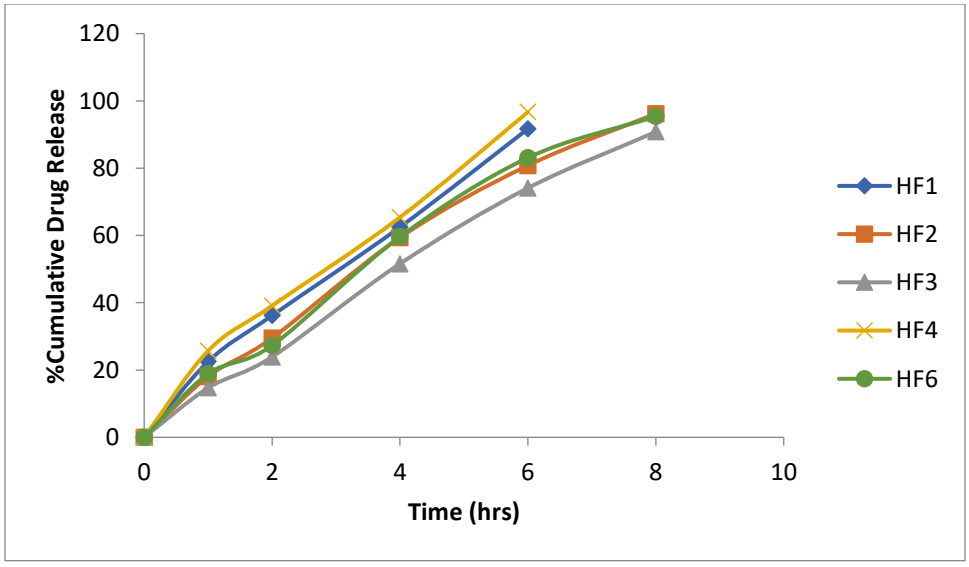

Fig1: In-vitro dissolution study of polyherbal tablet