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RESEARCH ARTICLE

# FORMULATION AND EVALUATION OF HERBAL EFFERVESCENT GRANULES INCORPORATED WITH MARTYNIA ANNUA EXTRACT

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**ABSTRACT**

The present research work is based on the formulation of herbal effervescent granules by incorporating the crude petroleum ether extract of *martynia annua*. The folklore of India widely uses this plant for treatment of various diseases and disorder. The dried leaves powder of the plant was extracted and subjected to preliminary chemical tests. Then it was formulated into efferevescent granules and then evaluated for various parameters like angle of repose, dissolution studies, and effervescent cessation time. The preliminary chemical studies show that the extract contains flavonoids, carbohydrate, alkaloids and glycoside. The formulated effervescent granules exhibited excellent flow properties which showed good angle of repose, carr's index, Hausner's ratio, bulk density and Tapped density.

**KEY WORDS:** *Martynia Annua,* Effervescent Granules, Carr's Index, Hausner's Ratio,

## INTRODUCTION:

According to the World Health Organization traditional medicine or herbal medicine is the accumulation of the knowledge, skills, and practices based on the theories, beliefs, and indigenized by different cultures, to maintain health. Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. Natural products from plant, animal and minerals have been the basis of the treatment of human disease [1-3]. Effervescent powders used as saline cathartics were available in the eighteenth century and were subsequently listed in the official compendia as compound effervescent powders. Effervescent mixtures have been moderately popular over the years since along with the medicinal value of the particular preparation, they offered the public a unique dosage form that was interesting to prepare. In addition, they provided a pleasant taste due to carbonation which helped to mask the objectionable taste of the drugs [4-5]. The choice of ingredients for effervescent granules depends both upon the requirement of the manufacturing process. The required ingredients are at least one acid and at least one base. The base must release carbon dioxide upon reaction with the acid. these are usually prepared from a combination of citric and tartaric acid rather than from a single acid because the use of either acid alone causes difficulties. Effervescent salts include the following ingredients, which actually produce the effervescence: sodium bicarbonate, citric acid and tartaric acid. When added to water the acids and base react to liberate carbon dioxide, resulting in effervescence [6].

*Martynia annua*, commonly known as the cat's claw, and is endemic to Mexico. It is a popular material for basket making among Native American tribes in the Southwest. The genus and species were first validly described by Carl Linnaeus in his 1753 publication *Species Plantarum*. An herbaceous erect, branched, glandular hairy annual. Leaves opposite, broadly ovate to deltoid, base cordate, apex acute, margins repand-dentate. Flowers large, foxglove shaped, pink and dark-purple blotched with yellow inside, borne in 10-20 flowered racemes. Fruits are hard, woody with 2-sharp recurved hooks and seeds oblong. The leaves contain chlorogenic acid, flavonoids, seeds- 10.35% of pale yellow semidrying oil and fatty acids (palmitic acid, stearic acid, oleic acid and arachidic acid). The leaves are eaten in times of scarcity. They are repeated in epilepsy and applied to tuberculosis gland of the neck. The juice is used as gargle for soar throat. The fruit is considered alexiteric and useful in inflammation, scabies, painful urination. [7-8]. The plant has medicinal values. In tribal pockets of Chhindwara and Betul Districts, Madhya Pradesh, root decoction is administered for snakebite [9]. In Marudhamalai hills, tribes use the juice of leaf for epilepsy, tuberculosis and sorethroat [10]. Besides these, the stem of the plant is used by Tantriks in some parts of India [11].



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**Figure 1:** ***Martynia annua***

**MATERIAL AND METHODS:-**

Plant collection and extraction: - Plant was collected from the GRKIST (Pharmacy) college campus of Jabalpur district and identified by local tribes. The 500g of powered plant material was extracted with pet. Ether for 72 h at 45°C. The extract thus obtained was then concentrated under vacuum using rotary vacuum evaporator and then subjected to preliminary chemical screening and thin layer chromatography to identify the active chemical constituents.

**FORMULATION OF HERBAL EFFERVESCENT GRANULES:**

Herbal effervescent granules were prepared by wet granulation method. The *martynia annua* leaves extract (active ingredient) 7.50 mg, polyvinyl pyrrolidone (PVP) binder 24.00 mg, Talc powder 7.50 mg, magnesium esterase 3.75 mg, saccharin 73.50 mg, polyethylene glycols (PEG) 12.00 mg, citric acid 79.33 mg, tartaric acid 158.66 mg and sodium bicarbonate 269.71 mg. The extract was dried in oven at 60oC to constant weight and triturated in a mortar and pestle to make powder then mixed with calculated amount of the other components. The binder was added and formed into a paste and granulated using meshes 40. Then sufficient alcohol was added to make a damp mass. This mass was passed through sieve no 20 to get granules and these granules were dried in hot air oven at 40°C and then they were packed in air tight container [2, 4-5].

**Figure 2: Herbal Effervescent Granules**

**EVALUATION OF FORMULATED HERBAL EFFERVESCENT GRANULES [14-17]:**

**ANGLE OF REPOSE:**

The fixed funnel method was employed to measure the angle of repose. A funnel was secured with its tip at a given height (h), above a graph paper that is placed on a flat horizontal surface. The blend was carefully pored through the funnel until the apex of the conical pile just touches the tip of the funnel. The radius of the base of the conical pile was measured. The angle of repose (θ) was calculated using the following formula:

**Tan θ = h/r,**

Where, θ = Angle of repose, h = Height of the cone, r = Radius of the cone base. Values for angle of repose ≤ 30° usually indicate a free flowing material and angles ≥ 40° suggest a poorly

flowing material, 25- 30 show excellent flow properties, 31-35 show good flow properties, 36-40
show fair flow properties and 41-45 showing passable flow properties.

**BULK DENSITY:**

15 g powder blend introduced into a dry 100 ml cylinder, without compacting. The powder was
carefully leveled without compacting and the unsettled apparent volume, Vo, was read. The bulk
density was calculated using the following formula.

**ρb = M / Vo**

Where, ρb = Apparent bulk density,M = Weight of sample, V = Apparent volume of powder

**TAPPED DENSITY:**

After carrying out the procedure as given in the measurement of bulk density the cylinder containing the sample was tapped 500 times initially followed by an additional taps of 750 times
until difference between succeeding measurement is less than 2% and then tapped volume, Vf was measured, to the nearest graduated unit. The tapped density was calculated, in gm per ml, using the following formula.

**ρtap = M / Vf**

Where, ρtap = Tapped density,M = Weight of sample,Vf = Tapped volume of powder

**Carr's Index (%)**

The Compressibility index (Carr's index) is a measure of the propensity of a powder to be compressed. It is determined from the bulk and tapped densities. In theory, the less compressible a material the more flowable it is. As such, it is measures of the relative importance of interparticulate interactions. In a free flowing powder, such interactions are generally less significant, and the bulk and tapped densities will be closer in value. For poorer flowing materials, there are frequently greater inter-particle interactions, and a greater difference between
the bulk and tapped densities will be observed. These differences are reflected in the Carr's Index which is calculated using the following formulas:

**Compressibility index = [(ρtap - ρb) / ρtap] / ×100**

Where,ρb = Bulk Density, ρtap = Tapped Density

**Hausner's Ratio**

Hausner's ratio is an indirect index of ease of powder flow. It is calculated by the following formula.

**Hausner's Ratio=Tapped density (ρt) / Bulk density(ρb )**

Where ρt tapped density and ρb is bulk density. Lower Hausner's ratio (<1.25) indicates better flow properties than higher ones, between 1.25 to 1.5 showing moderate flow properties and more than 1.5 poor flow.

**Effervescent Cessation Time**

100ml of distill water was taken in 250ml beaker, one dose of effervescent granules were poured in to the beaker, effervescent cessation time and effervescent production was observed.

**RESULTS AND DISCUSSION:**

The pet. ether extract of *M. annua* after extraction gave % yield of 18.5%w/w. When subjected to preliminary chemical screening showed the presence of flavonoids, glycoside and tannins. The colour of the granules was light green with characteristic odor. The angle of repose of granules was 33.02, Bulk density **(ρb),** and tapped density (**ρtap**) was 0.55 and 0.71 respectively. The Compressibility index (Carr's index) was 22 and hausner ratio was 1.29 which shows its moderate flow property. The effervescent cessation time was 2-3 min and all results are tabulated in table no. 1.

**Table 1: Physical Evaluation of Granules**

| Sr. No. | Parameter | Result |
|---|---|---|
| 1. | Angle of Repose | 33.02 |
| 2. | Bulk density | 0.55 |
| 3. | Tapped density | 0.71 |
| 4. | Carr's index | 22 |
| 5. | Hausner ratio | 1.29 |
| 6. | Effervescent Cessation Time | 2-3 min. |
| 7. | Color | Olive green color |
| 8. | Odor | Characteristic odor |
| 9. | Apperance | Amorphous Granules |

**CONCLUSION:**

The extract of martynia annua was found to contain glycoside, alkaloids and carbohydrate which are the active ingredients drug. Effervescent granules were formulated from the pet. Ether leaves extract of m. annua and optimized using different granules additives for convenient oral administration granules. The formulated granules were subjected to the known official monographs

requirements and were found to comply with the standards of the BP and IP. These granules which were prepared from local plant that grows wild in India and other parts of world can be used as an effervescent drug with low price and short disintegration time.

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