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DEVELOPMENT AND EVALUATIONS OF A HERBAL CAPSULE FOR THE MANAGEMENT OF ANGINA PECTORIS

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ABSTRACT

The purpose of the study was to develop and evaluate the herbal capsule of Arjuna powder. The capsule was prepared by manual capsule filling machine in which herbal drug Arjuna powder was used. The prepared capsules were evaluated by weight variation test, content uniformity, disintegration test and dissolution test. Three formulations (F1, F2, and F3) were prepared and evaluated. Among them, F2 showed better performance in weight variation, disintegration, and dissolution studies. Therefore, formulation F2 may be considered as the optimized formulation for the management of cardiovascular disorders Arjuna is a well-known medicinal plant used in cardiovascular disorders. The Arjuna capsule is useful in the management of angina pectoris by improving heart function and blood circulation. Thus, Arjuna powder capsule may be beneficial in the treatment and management of angina pectoris.

KEYWORDS: Terminalia Arjuna bark Powder, Angina pectoris Cardiovascular diseases, Herbal Capsule Formulations.

INTRODUCTION

A well-known and highly valued medicinal plant widely used in the Ayurvedic system of medicine for the treatment of cardiovascular diseases. Since ancient times, it has been recognized for its significant therapeutic potential in managing heart-related disorders. In the modern era, cardiovascular diseases such as angina pectoris, hypertension, myocardial infarction, and coronary artery disease have become major global health concerns. These

disorders are associated with high morbidity and mortality rates, thereby creating a growing demand for safe, effective, and affordable treatment options. In recent years, the prevalence of cardiovascular diseases has increased rapidly due to changes in lifestyle, including unhealthy dietary habits, stress, lack of physical activity, and other risk factors. As a result, there has been a shift towards the use of herbal medicines, as they are considered safer for long-term use and are associated with fewer side effects compared to synthetic drugs. Herbal therapies not only provide symptomatic relief but also support the body's natural healing mechanisms, making them an attractive alternative in chronic disease management.

In pharmaceutical sciences, the selection of an appropriate dosage form is crucial for ensuring the efficacy and patient acceptability of a drug. Among various dosage forms, capsules are one of the most commonly used oral drug delivery systems due to their numerous advantages. Capsules provide accurate dosing, ease of administration, improved stability, and better patient compliance. They are particularly suitable for herbal formulations, as they effectively mask the unpleasant taste and odor of plant-based powders. Moreover, capsules allow uniform distribution of the drug and excipients, ensuring consistency in drug release and therapeutic effect.

The formulation of herbal capsules requires careful selection of excipients and optimization of formulation parameters to achieve desired quality attributes. Evaluation of the prepared capsules is an essential step to ensure their quality, safety, and effectiveness. Various evaluation parameters such as weight variation, content uniformity, disintegration time, and dissolution profile are studied to assess the performance of the formulation. These tests help in determining whether the capsules meet the required pharmacopeial standards and are suitable for therapeutic use.

Therefore, the present study focuses on the formulation and evaluation of capsules containing Terminalia arjuna bark powder. Multiple formulations are prepared and compared to identify the most optimized formulation with superior performance. The aim of this study is to develop a stable, effective, and patient-friendly herbal dosage form that can be used in the management of cardiovascular disorders, particularly angina pectoris, while improving patient compliance and therapeutic outcomes.

MATERIALS AND METHOD

Materials:- Arjuna:

It is widely used in Ayurvedic medicine for the treatment of cardiovascular diseases such as angina pectoris and hypertension. It acts as a cardiotonic and helps in strengthening the heart muscles, improving blood circulation and maintaining healthy blood pressure levels. Generally use in arjuna bark powder in formulations.

Methods

Preparation of Arjuna Capsules

Formulations of Herbal Capsule (Terminalia Arjuna Powder capsule) Procedure

- Capsule filling is carried out using a manual capsule filling machine.
- Place the encapsulation plate on top of the cap plate.
- Then place the encapsulation plate on the body plate and separate the capsule caps and bodies.
- Adjust the powder guard over the body plate to prevent powder from falling from the sides.
- Spread the required quantity of Arjuna powder uniformly over the body plate using a spreader.
- Use a tamping plate to fill the powder properly into the capsule bodies.
- If the capsule bodies are not completely filled, repeat the tamping process again.
- Remove the filled cap plate and place the middle sheet on the top (the hole with the bigger diameter should face the cap plate).
- Press the plates gently so that the caps and bodies join together properly.
- Finally, remove the filled capsules from the machine and collect them in a clean container.

Evaluation of herbal capsule

(a) Descriptions:- Size, shape, colour etc. were evaluated.

(b) Uniformity of weight:- Test for uniformity of weight was performed as per Indian pharmacopoeia, 1996.

(c) Disintegration test for capsule:- The disintegration test of the prepared capsules was carried out by using a disintegration test apparatus. One capsule was placed in each tube of the basket assembly and a disc was added to each tube. The basket assembly was then suspended in a 1000 ml beaker containing distilled water. The volume of water was

adjusted in such a way that the wire mesh at its highest point remained at least 25 mm below the surface of the water and at its lowest point was at least 25 mm above the bottom of the beaker. The apparatus was operated and the temperature was maintained at 37 ± 2°C throughout the experiment. The time required for complete disintegration of the capsules and passage of particles through the wire mesh was recorded.

(d) Dissolution test:- The dissolution test of the prepared capsules was carried out using a dissolution test apparatus. One capsule was placed in each dissolution vessel containing 900 ml of dissolution medium. The temperature of the medium was maintained at 37 ± 2°C throughout the experiment. The apparatus was operated at a specified rotation speed.

At specific time intervals, samples were withdrawn from the dissolution medium and replaced with an equal amount of fresh medium to maintain a constant volume. The samples were then analyzed to determine the amount of drug released from the capsules.

RESULT AND DISCUSSION

The results of the three formulations (F1, F2, and F3) of Terminalia arjuna powder capsules are shown below.

The formulation of the herbal capsules was carried out in three different batches, namely F1, F2, and F3, by slightly modifying the proportions of the herbal ingredients in each batch. Each formulation was developed to study the variation in composition and its effect on the final product. The detailed composition of all batches is presented in Table 1 for comparison and evaluation.

Table: Formulation of Herbal Capsule (Terminalia Arjuna Powder)

S.No	Ingredients Name	Quantity		
		F1	F2	F3
1.	Terminalia Arjuna Powder	300 mg	300 mg	300 mg
2.	Lactose	120 mg	120 mg	120 mg
3.	Starch	40 mg	40 mg	40 mg
4.	Sodium starch glycolate	20 mg	20 mg	20 mg
5.	Magnesium Sterate	10 mg	10 mg	10 mg
6.	Talc	10 mg	10 mg	10 mg

• **Description:-** The prepared formulations (F1, F2, and F3) of Terminalia arjuna powder capsules were evaluated for various parameters size, shape and colour profile**.**

Table: size, shape and colour of terminalia arjuna capsule.

S.NO	F1(mg)	F2 (mg)	F3(mg)
1.	460	500	*450*
2.	490	500	*450*
3.	510	500	*510*
4.	510	*500*	*460*
5.	510	*490*	*480*
6.	490	*500*	*460*
7.	540	*500*	*510*
8.	510	*480*	*490*
9.	520	*510*	*500*
10.	550	*510*	*480*
11.	530	*510*	*490*
12.	530	*510*	*470*
13.	540	*530*	*500*
14.	510	*530*	*500*
15.	470	*500*	*490*
16.	530	*500*	*480*
17.	*510*	*500*	*490*
18.	520	*510*	*470*
19.	510	*500*	*475*
20.	520	*500*	*490*

• **Uniformity of weight:** The weight veriation are in following below :

Table: Uniformity of weight of terminalia arjuna capsule.

S.No	Parameters	Observation
1.	Size	Small to medium
2.	Shape	*Elongated* capsule (cylinder and rounded)
3.	Colour	Bio colour (red and white)

Disintegration test for capsule

Disintegration test was performed using the digital micro-processor \based disintegration test apparatus by VEEGO. One capsule was introduced into each tube and added a disc to each tube. The assembly was suspended in the water in a 1000 ml beaker.

Table: Disintegration test of terminalia arjuna capsule.

S.NO	Formulation	Time(minutes)
1.	**F1**	**15 min**
2.	**F2**	**10 min**
3.	**F3**	**20 min**

Dissolution Test for Capsule (IP method)

Dissolution test was performed using a digital micro-processor based dissolution test apparatus by VEEGO according to IP method. The dissolution medium (900 ml) was maintained at 37 ± 0.5°C in the vessel. One capsule was placed in the medium and the paddle was rotated at a specified speed. Samples were withdrawn at specific time intervals and analyzed to determine the drug release from the capsule.

Table: Dissolution test of terminalia arjuna capsule.

S.NO	Formulation	Time(minutes)
1.	**F1**	**35 min**
2.	**F2**	**30 min**
3.	**F3**	**40 min**

***Fig.*: Uniformity weight variation of Arjuna capsule.**

Fig.: Dissolution test of Arjuna capsule.

Fig.: Disintegration test of Arjuna Capsule.

Fig.: Formulation of Herbal Arjuna Capsule.

SUMMARY AND CONGRATULATIONS

The herbal capsules containing Terminalia arjuna powder were developed for the management of angina pectoris and other cardiovascular disorders. Arjuna contains phytoconstituents such as flavonoids, tannins, glycosides, and antioxidants, which exhibit cardioprotective and antioxidant activities.

Three formulations (F1, F2, and F3) were prepared and evaluated. Among them, F2 showed better performance in weight variation, disintegration, and dissolution studies.

Therefore, formulation F2 may be considered as the optimized formulation for the management of cardiovascular disorders.

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