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Extraction of Starch from Taro (Colocasia esculenta) and Evaluating it and Further Using Taro Starch as Disintegrating Agent in Prazosin Hydrochloride Tablet Formulation with Over All Evaluation

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ABSTRACT

Originating in Southeast Asia, taro (Colocasia esculent Linn.) is a tropical root that is grown vegetatively. It is produced throughout Africa and is ranked ninth among food crops worldwide. In tropical and subtropical regions, taro tubers constitute a staple diet and a significant source of carbohydrates for energy. The main reason it is grown is because its buried corms have a 1.2% content. In addition, potassium, copper, manganese, iron, phosphorus, zinc, niacin, and vitamin B6 are all abundant in taro. It is also a good source of thiamine, riboflavin, and other minerals. Aro is also useful for encasing flavoring components.

To highlight taro starch in the realm of pharmaceutical research, more studies on the starch can be conducted and released onto the market. Taro has been employed in numerous industrial processes in addition to being used in culinary preparation. Taro starch granules are perfect for use in face powder and dusting solutions that use aerosol dispensing systems because of their minuscule size. Despite the aforementioned applications, large-scale starch extraction and use remain unusual. Consequently, this study may lead to more discussion and consideration of taro starch within the pharmaceutical research community.

Keywords : Tropical Root, Taro Tubers, Pharmaceutical Research, Starch Granules

I. INTRODUCTION

One kind of carbohydrate is starch, which is composed of several glucose molecules joined by glycosidic bonds. This polysaccharide is produced by all green plants as a way to store energy. The most frequent kind of carbohydrates in the human diet, they are present in large amounts in a variety of everyday foods such as potatoes, wheat, corn, rice, and cassava. Referred to as "native starch" when it is used directly out of the plant or as "modified starch" when it has undergone one or more changes to attain specific properties, A white powder with no taste or odor that is insoluble in cold water or alcohol is called

pure starch. It is composed of two distinct types of molecules: linear and helical amylose and branched amylopectin.[1]

Starch typically comprises 20–25% amylose and 75–80% amylopectin, depending on the plant. It's clear that starch has evolved throughout time from a staple diet to a necessary medical component. Due to its sticky, thickening, gelling, swelling, and film-forming qualities, as well as its accessibility, affordability, and controlled quality, starch is frequently employed in medicine. Reliability and familiarity are key factors for the use of starches such as potato, wheat, extra-white corn, and maize starch as powders for packs, fillers, and insoluble diluents without sacrificing their solubility. Starch is typically removed from foods including potatoes, wheat, cassava, corn, and maize.[2-4] Still, not much research has been done on how to extract starch from the tubers of taro (Colocasia esculenta). Therefore, this study's objectives are to extract the starch from taro (Colocasia esculenta), assess it, and then utilize it in tablet formulation while carrying out a comprehensive analysis. To sum up, the present study proposes that taro starch should be included in the field of current research since it can demonstrate greater efficacy and efficiency than other natural starches, particularly in the role of a disintegrant, and that it can be further tailored with additional study. Taro is rich in nutrients and readily absorbed carbs.[5]

Hypertension is one common cardiovascular condition. Cardiovascular diseases are responsible for between 20 and 50 percent of deaths globally. An alpha blocker and BCS class II antihypertensive medication is prazosin hydrochloride. It is used to treat hypertension and heart failure.[6] The results of the current study indicate that taro starch differs in several ways from starch extracted from other traditional sources, like corn and potatoes. Taro is said to include 70–80% starch in the form of little granules. These tiny granules make taros incredibly easy to stomach.[7-8]

Taro contains antinutrients such as oxalate, phytate, and tannin. Taro decomposes quickly due to its high moisture content, but it can last up to a month if maintained intact and stored in a sheltered area.

Figure 2: Taro Tubers

Taro:

1. Scientific Classification:

- Botanical name: Colocasia esculenta
- Kingdom: Plantae
- Order: Alismatales
- Family: Araceae
- Sub Family: Aroideae T
- ribe: Colocasiodeae
- Genus: colocasia Species: C. esculenta
- Common names: Taro, Kalo, Eddy root, wild taro, Arvi, Talas.[9]

3. Description:

Antinutrients such as phytate, tannin, and oxalate are found in taro. Because of its high moisture content, taro breaks down quickly, but if kept whole and kept in a protected place, it can last for up to a month. The new study's findings show that taro starch is distinct from starch derived from other conventional sources, such as corn and potatoes, in a number of ways. According to reports, 70–80% of the starch in taro comes in the form of tiny granules. It is quite easy to digest taros because of their little grains.[10]

2. Constituents:

Hydroxyl cinnamoyl amides, benzaldehyde 3 4 diO beta glucoside, beta carotene, colocasia sterols, fructose, glucose, sucrose, thiamine, riboflavin, niacin, oxalic acid, calcium oxalate, pelargodin 3 glucoside, cyaniding 3 rhamnoside, cyaniding 3 glucoside, hydroxyl cinnamoyl amides, fructose, glucose, and sucrose are the chemical components of the tuber. It also has a high starch content. The leaves are rich in

calcium, phosphate, and iron. Its iodine content is 2.26 parts per million. Included are a bitter substance called acorine, which appears to be a nitrogenated glucoside, and a fragrant essential oil.[11]

4. Uses:

a. Medicinal Use: Taro was used medicinally by the Hawaiians to cure a wide range of conditions, including constipation and TB. It acts as a laxative in situations of hemorrhoids. The raw juice was given orally, combined with sugar, to bring down the temperature. The leaves of the plant, which are high in vitamins A, B, and C, were originally used to treat asthma. Taro is good for kids who are allergic to wheat or dairy, and it can be consumed by kids who are sensitive to milk. It is a probiotic since it includes the predominant lactic acid bacteria. Studies have shown that it may be useful in the treatment of cancer, irritable bowel syndrome, diarrhea, gastroenteritis, a low immune system, and inadequate lactase digestion. In the Philippines, women who were experiencing difficulties giving birth would boil and consume corms and taro leaves. Certain tribes utilize the hot taro tubers as a rheumatism pain reliever and as a defense against wasps and other biting bug stings. Additionally, a mixture of honey and tuber ash was applied to the apthae in the mouth.

b. Industrial Use: Although this was not a widespread practice, petioles were occasionally used to form dots or semicircles motifs on fabric. In actuality, a variety of kinds were used to make red kapa dye. The raw material for biodegradable plastics is taro starch.

c. Food Source: Packed with easily digested starch, taro corms are a great source of carbs and, to a lesser extent, protein and potassium.[12-14]

II. MATERIALS AND METHODS

Experimental Work Experimental work of this Research activity consists of the following sections:

1. Collection of tuber
2. Extraction of starch from tubers
3. Preliminary testing of starch
4. Formulation of tablet using extracted starch as disintegrating agent
5. Overall evaluation of starch and its properties

Extraction of Starch from Tubers:

After being gathered, the taro tubers were carefully cleaned and rinsed. After washing, the outermost layer was removed. The tuber was then sliced and allowed to come to room temperature. After the tuber pieces had dried, they were crushed in a mixer grinder to generate the powder. This powder can also be used for starch extraction.

Extraction by Simple Process:

Following the pulverization of 50 grams of taro powder in 100 milliliters of water, a homogenizer was used to blend the mixture for about thirty minutes. The finished product was put away for the evening. The next day, the layers of solid and liquid separated, with the solid substance sinking to the glass beaker's bottom and the liquid floating on top. To remove any remaining sediment, more water is needed after the liquid layer has been removed. After washing, the water is poured out, and Whattman filter paper is used to extract the starch powder. Next, the powder is kept dry in storage. Starch powder is created as the material dries.[15]

Figure 2: Extracted taro starch powder

Making a Tablet with Removed Starch as a Disintegration Agent Conventional corn starch and extracted taro starch are mixed with additional components as dissolving agents to make placebo tablets. Then, wet, dry, and direct compression methods were used to create tablets.

1.Formulation Table:

Table no.1: Formulation Table

Sr. No.	Ingredients	Quantity weighed in mg
1.	Prazosin hydrochloride	10
2.	Mcc	100
3.	Lactose	180
4.	Starch	57
5.	Magnesium stearate	3

2. Preparation of Placebo Tablets by Direct Compression Method

When compressing tablets using the direct compression method, starch was utilized as a dissolving agent. All the components required by the recipes were mixed into a sealed plastic bag. The mixtures were compressed into tablets on a tablet punching machine using flat and round punches until the tablets reached a hardness of 4.8 kg/cm2. In this case, thirty pills were compacted.

3. Preparation of Placebo Tablets by Wet Granulation Method

After carefully weighing each component, they were all mixed together in a mortar. After adding distilled water and a suitable amount of microcrystalline cellulose as a granulating agent, the mixture was agitated for 20 minutes. After passing through sieve number 22, the moist material was roasted at 50 degrees Celsius for six hours. The dried granular material was passed through sieve number 40 in order to obtain granules of uniform size. The batch of granules and the premeasured quantity of disintegrant, or taro starch, were compressed into tablets using a rotating tablet press, all while maintaining a constant pressure. Next, the mixture was mixed with the same volume of magnesium stearate.

4. Preparation of Placebo Tablets by Dry Granulation Method:

The proper quantity of chemicals and various components are ground. After mixing the ground powders, screen No. 22 is used to filter the mixture. The next step is to compress the material into large, durable tablets to make slugs. Slugs go through three stages of screening, crushing, and screening again with a no. 40 sieve after the crushing process. After combining the screened powder, screened lubricant, and disintegration agent powder, the tablet is crushed or punched using a rotary tablet punching machine.[16]

Evaluation of Tablets:

1. Test of Hardness: Five tablets were randomly selected from each batch for this test. A Pfizer hardness tester (Elite, Mumbai, India) was used to measure the hardness. The tablet was compressed with a diametric force when it was positioned between the tester's spindle and anvil, and the calibrated scale was reset to zero. Next, the kilogram unit of the tablet's fracture position was documented on the calibrated scale. The mean hardness of each batch was calculated.
2. Weight Uniformity Test: Twenty pills were randomly selected and weighed from each batch. The mean weights of each batch were calculated.
3. Test for Friability Ten randomly selected tablets were ground into powder, weighed all at once, and then added to the friabilator. The machine was turned off after 100 revolutions at 25 rpm. The tablets were weighed again after being dusted. We calculated the percentage loss.
4. Disintegration Time: The experiment used 100 milliliters of 0.1 N HCl as the disintegration medium, and the USP/NF (1980) technique called for maintaining the temperature at 37±2°C. Five pills, one for each of the cylindrical tubes in the basket, were randomly selected from each batch; a disc was not used. The amount of time it took for each tablet to break up into tiny fragments and slip through the mesh was timed. The mean disintegration time was calculated for each batch.[17-20]

III.RESULTS & DISCUSSION

Table no.2: Observation of Physical Tests

Pre-formulation study	**Bulk density**	**Tapped Density**	**Particle Size**	**Angle of Repose**	**Melting point (thieles Tube Apparatus)**
Taro starch extract	0.35 gm/cm^3	0.38 gm/cm^3	2-20 micro meter	28.54^0	267±2^{o}c

Table no.3: Observation of Chemical Tests

Sr.No	Chemical test of taro starch extract	Results
1.	Molish Test (Carbohydrate)	positive
2.	Legal Test (Glycoside)	positive
3.	Protein Test	positive
4.	Reducing sugar test	Positive
5.	Benidict test (sugar)	Positive

Table no.4: Evaluation Tests of Extracted Taro Starch Powder by Different Method of Extraction

Sr. No	Granulation type	Hardness (Kg/cm2)	Weight variation %	Friability %	Disintegration Time (mins)
1.	Direct compression	11	2.5	1.1	5.19
2.	Dry granulation	10	3	1	4.55
3.	Wet granulation	11	2	0.8	3.15

Table no.5: Evaluation Tests of Extracted Taro Starch Powder

Sr.no	Property	Selected Tablet of Taro Starch with prazosin hcl (wet Granuled) (A)	Minipress xl 5 mg Tablet (B)	Prazosync xl 5 mg Tablet (C)
1.	Hardness (Kg/cm2)	11	11	12
2.	Weight variation %	2	1.5	2
3.	Friability %	0.8	1.2	0.9
4.	Disintegration Time (mins)	3.15	5.20	4.55

IV. CONCLUSION

Taro corms are used as a vegetable and are regarded as an excellent source of carbohydrates, proteins, vitamins, and minerals. The starch content of taro tubers ranges from 70 to 80 percent. There are tiny, readily absorbed particles. According to a recent evaluation of starch's properties, taro starch disintegrates more readily than other ordinary starches. Excipients such as starches have long been utilized in medicinal preparations. Testing was done on the isolated taro starch powder, both chemically and physically. However, the results of the disintegration tests of various brands of prazosin hydrochloride were compared using the removed taro starch powder. Pure prazosin hydrochloride medication was compacted with the powdered extract of taro starch. The API with taro starch powder shows excellent disintegration test results when compared to minipress XL 5 mg and prazosync XL 5 mg. As a result, the pharmaceutical research

community may talk about and give taro starch more thought after this study.

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