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Formulation, Standardization and Screening of Polyherbal Churna for Antacid Activity

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Abstract:
The current study set out to standardise a polyherbal formulation containing pomegranate peel, carom seeds, cumin seeds, ginger, and garlic in order to demonstrate the antacid properties of the mixture. The dried powder of herbs was mixed in precise amounts to create the polyherbal churna, which was subsequently standardised. Churna's polyherbal formulation was compared to gas o quick commercialised preparation. The formulation exhibits the same ability to neutralise acids as the usual medication. Our research led us to the conclusion that our polyherbal churna can serve as a natural antacid. The churna performed similarly to commercially available prepration gas o quickly. The mixture is useful in treating hyperacidity, gastroesophageal reflux syndrome, and hyperacidity and GIT problems.

Keywords: Antacid, polyherbal mixture, ability to neutralise acids, quick gas release, and standardisation.

Introduction:

The stomach's acid production helps break down food throughout the digestion process. Overproduction of acid in the stomach leads to pain, heartburn, and disturbances in the gastrointestinal tract.1. The acid in the stomach has a pH of 1-2. The activation of digestive enzymes required for the breakdown of long-chain amino acids can be facilitated by stomach acid with ease. Stomach acidity is the cause of the disorder known as acid reflux disease. The liquid components of mixed digestive juices cause heartburn and other gastrointestinal tract discomfort, which in GERD patients drives back to the esophageal lining.3 There are several causes of dyspepsia, including junk food, irregular schedules, alcohol, smoke, stress, narcotics, insufficient water intake, inadequate dietary fibre, and an off-kilter biological clock. Herbal antacids, when used with medicinal herbs, can help lower the production of acid in the stomach when hyperacidity is present. The World Health Organisation estimates that 80% of people use herbal and traditional treatments as their main form of care. Herbal medicines are safe, easily accessible, and have little side effects, if any. Many plant extracts and herbal medicines were used to treat hyperacidity. For treating stomach lining acidity, herbal remedies have become more popular than synthetic antacids due to the latter's potential for numerous side effects and drug interactions. Therefore, we tried to perform biological standardisation, phytochemical screening, and assessment of the polyherbal formulation's antacid action in the current work by When medicinal plants are used, herbal antacids can be effective in reducing the stomach's acidic production in cases of hyperacidity. The World Health Organization calculated that using titration to assess the formulation's ability to neutralize acids.[3]

Materials and procedures:

Plant Materials

Churna is a type of herbal antacid that is made by combining a few powerful plants (dry powders) that may be used to treat GERD. To make the churna, several herbs that have a propensity to counteract stomach acid were chosen. The plant ingredients were purchased at the local market. These included dried rhizomes from Zingiber officinale, peels from Punica granatum, ripe bulbs of Allium sativum, and seeds of Cuminum cyminum. In the Pharmacognosy Lab, microscopic techniques were used to authenticate each of these botanicals.

Formulation of Polyherbal Churna:

Each plant was meticulously cleaned, allowed to dry, and then milled into a fine powder. After the finely ground raw materials passed through sieve number 40, 1g of each drug was weighed and mixed according to the correct ratio (1:1:1:1:1). Black salt was used to enhance the flavour and customer appeal. The churna was contained in an airtight container. The formula composition for the polyherbal churna is shown in Table 1.

Standardisation of Churna Made of Herbs:

Calculating pH

Using a digital pH metre, the pH of a 1% solution of the prepared polyherbal churna was determined.

Calculating Ash Values:

Total Value of Ash

A precise weight of 2g of churna was measured and added to a silica crucible that had already been lit. At 500–600°C, the material was torched until it turned white, signifying the lack of carbon. After cooling, the total ash was computed in ml per gram.

Acid Insoluble Ash Content:

Using 25 ml of diluted hydrochloric acid, half of the ash from the dish used for total ash cleaning was cleaned into a 100 ml beaker. Boiling a wire gauge over a Bunsen burner took five minutes. The residue went through two hot water washes after being filtered through ash-free paper. After lighting the crucible on fire and letting it cool, it was weighed. The acid insoluble ash content of the drug was calculated using the air-dried crude drug sample as a reference.

Acid Insoluble Ash Content:

The crucible containing the other half of the total ash content was filled with twenty-five millilitres of boiling water. The entire mixture was then filtered using ashless filter paper. After adding the insoluble substance to a crucible, the filter paper was burnt to a constant weight. The residue was allowed to cool before being weighed.6 Finding the Extractive Value

Value of Water Soluble Extractive:

Five gram of churna were precisely weighed and added to a conical flask. It was filled with 25 ml of water and left for a full day, with periodic shaking of the flask. After that, the combined contents were moved to a china dish, allowed to cool, and then dried out using a water bath before being weighed.

Soluble Extractive Value of Ethanol:

Five gram of churna were precisely weighed and added to a conical flask. After adding 25 ml of ethanol, it was left for a whole day, with periodic shaking of the flask. After that, the combined contents were moved to a china dish, allowed to cool, and then dried out using a water bath before being weighed.[7,11]

Value of Soluble Chloroform Extractive:

Five gram of churna were precisely weighed and added to a conical flask. It was filled with 25 ml of chloroform and left for a whole day, with periodic shaking of the flask. After that, the combined contents were moved to a china dish, allowed to cool, and then dried out using a water bath before being weighed.[7]

The Soluble Extractive Value of Petroleum Ether:

Five gram of churna were precisely weighed and added to a conical flask. After adding 25 ml of petroleum ether, it was shaken the flask once a day for the next 24 hours. After that, the combined contents were moved to a china dish, allowed to cool, and then dried out using a water bath before being weighed.[11]

Content of Moisture (Loss on Drying)

The churna was placed within a measuring cup. It was weighed after 15 minutes at 105°C in a hot air oven. After the weight of the formulation stabilised, the percentage of water lost during drying was calculated.[7]

Index of Swelling:

A stoppered measuring cylinder with 9 ml of water and 1 g of formulation was added, and the cylinder was left alone for a full day. A swelling index was computed once the formulation's swelling was observed.[8]

Initial Phytochemical Examination:

Using the accepted protocols for initial phytochemical screening, the presence of alkaloids, steroids, tannins, saponins, and glycosides was examined in crude petroleum ether, chloroform, ethanol, and aqueous extracts.[7, 11, 12] The qualitative findings are represented by the symbols (+) for phytochemical presence and (-) for phytochemical lack.[8]

Evaluation of Antacid Activity:

The test for acid neutralising capacity was performed at 37±3°C. Potassium dihydrogen phosphate, a standardised buffer, was used to standardise the pH metre. Utilising a magnetic stirrer, a stirring rate of 300±30 rpm was achieved. In separate 250 ml volumetric flasks, 70 ml of distilled water was mixed with 2 gram of formulation and 2 ml of standard solution (gas or fast solution), respectively. With a magnetic stirrer, the solutions were agitated for a minute. The pH of each solution was noted. Thirty ml of 0.1 N HCl were added to each solution, and a magnetic stirrer was used to agitate the mixture for fifteen minutes. The pH value that was recorded was noted. In order to get a consistent pH of 4.5 in the solutions, 0.5 N NaOH was titrated. [4, 8, 9]

Results And Discussions:

Standardization of Herbal Churna

The concoction known as churna was a homogeneous blend of finely ground plants possessing antacid properties.The pH of the formulated churna was assessed to be 6.4 in order to ensure that the formulation does not cause any gastrointestinal irritation. An increase in the ash value denotes adulteration, substitution, and contamination because the ashing process requires the whole oxidation of the product's components. The total amount of inorganic material remaining after total incineration is indicated by the total ash value.5. The results of the calculation were: Water Insoluble Ash: 13.65%, Acid Insoluble Ash: 3.35%, and Total Ash Value: 17.2%. The extractive values help determine the number of active constituents in a medicinal plant material as well as the type of phytoconstituents. The extraction values for ethanol,

water, chloroform, and ether were determined to be 7.18 percent, 9.6%, 2.35 percent, and 1.55%, respectively. Therefore, the most effective solvent for removing the phytoconstituents from the prepared churna was ethanol. To ascertain whether moisture absorption contributed to any weight gain, the moisture content was ascertained.The formulated churna's moisture content or loss upon drying was 0.30%. The polyherbal churna4 did not include any mucilaginous compounds, as indicated by the negative results of the swelling index test. Table 2 presents the results of the churna standardisation.

Table 1: Formula Composition of Polyherbal Churna

Drug	Biological Source	Part Used	Quantity
Ajwain	Trachyspermum ammi	Seeds	1 gm
Cumin	Cuminum cyminum	Seeds	1 gm
Garlic	Allium sativum	Ripe Bulb	1gm
Ginger	Zingiber officinale	Dried Rhizome	1gm
Pomegranate	Punica granatum	Dried Peel	1gm

Table 2. Standardization of Polyherbal Churna

Sr. no.	parameters	Polyherbal churna
1	pH	6.8
2	Total Ash Value	16.8%
3	Acid Insoluble Ash Content	4.20%
4	Acid Insoluble Ash Content	12.50%
5	Value of Water Soluble Extractive	7.50%
6	Soluble Extractive Value of Ethanol	8.5%
7	Value of Soluble Chloroform Extractive	2.80%
8	The Soluble Extractive Value of Petroleum Ether	1.80%
9	Content of Moisture (Loss on Drying)	0.39%
10	Index of Swelling	Negative

Initial Phytochemical Examination

Table 3: Initial Phytochemical Examination

S. No	PC	IT	WE	AE	CE	PEE
1	Carbohydrate	Molish examination	+	+	+	-
		Fehlings examination	+	+	+	-
		The Phloroglucinol Tollen's	-	-	-	-
		Benedict's examination	-	-	-	-
2	Starch	Test for Iodine	+	+	-	-
3	Mucilage	Test of Ruthenium	+	+	+	-

4	Protein	Test for Xanthoprotein	-	-	-	-
		The Millons test	-	-	-	-
5	Amino acids	Test for Ninhydrin	+	-	-	-
6	Steroids	Salkowski's response	+	-	-	+
7	Cardiac Glycosides	Legal trial	-	-	+	-
		Raymond's test	-	-	-	-
		Test for deoxysugar (Keller-kilani test)	+	+	-	-
8	Anthraquinone glycosides	The Borntrager test	-	-	-	-
9	Saponin glycosides	Test for foam	-	-	-	-
10	Alkaloids	Mayer's examination	-	+	-	-
		Wagner's examination	+	+	+	-
		Test for tannic acid	+	+	-	+
11	Tannins	Tests for lead acetate	+	+	+	-
		5% FeCl3 test	+	+	-	-
		Acetic acid test	-	+	-	-
		Dil. HNO3 test	-	+	-	-
		Dil. NH4OH test	-	+	-	-
12	Acidic Compounds	Sodium bicarbonate test	+	+	-	-
		Litmus paper test	+	+	+	-

PC Phytoconstituents, IT: Identification Tests, WE: Water Extract, AE: Alcohol Extract, CE: Chloroform Extract, PEE: Petroleum Ether Extract

Table 4: Comparative antacid activity of Polyherbal Churna and Gas o Fast

Steps	Test drug (Polyherbal Churna)	Standard drug (Gas o Fast)
1	Polyherbal Churna + 70 ml of distilled water is the test medication.	Gas o Fast + 70 ml distilled water.
	pH- 6.7	**pH- 6.8**
2	15 minutes of stirring were spent churna + 70 ml distilled water + 30 ml 0.1 N HCl.	For 15 minutes, stir the mixture of Gas o Fast, 70 ml distilled water, and 30 ml 0.1N HCl.
	pH- 3.7	**pH- 3.9**
3	20 millilitres of concentrated hydrochloric acid were added to the solution above, bringing the pH to 3.7.	The solution was mixed with 20 ml of concentrated hydrochloric acid (pH = 3.9)..
	pH- 2.6	**pH- 2.8**
4	To get the solution's pH down to 3.8, it was titrated with 0.5 N NaOH. 51 ml of 0.5 N NaOH are needed.	To get the pH of 3.8, the solution was titrated with 0.5 N NaOH; 48 ml of 0.5 N NaOH were needed.
	Volume of **0.5 N NaOH** required- **51 ml**	Volume of **0.5 N NaOH** required- **48 ml**

Initial Phytochemical Examination:

Table 3 lists the outcomes of the initial phytochemical screening. Our conclusion from these identification tests was that the alcoholic extract included the greatest amount of phytoconstituents because it passed the majority of the chemical tests. Water, chloroform, and petroleum ether extracts were next in line.

Evaluation of Antacid Activity:

Due to the churna's exact ratio of each component herb, it possesses antacid properties similar to those of the name-brand drug Gas o Fast. When utilising Gas o Fast and 70 ml of water, the resulting churna's pH increased to 6.8 from 6.7 in distilled water. The pH was lowered to 3.7 and 3.9, respectively, after 15 minutes of stirring and the addition of 30 ml of 0.1 N HCl, 20 ml of concentrated HCl to the churna, and 70 ml of water. Similarly, the pH of the standard was lowered to 2.6 and 2.8, respectively. Both the standard and the test medication (formulated churna) reached pH 3.8 during titration with 0.5N NaOH. as result, it was determined that the polyherbal churna that was created was just as effective as the conventional medication, Gas o Fast. Consequently, this churna may also help with digestive issues.[4]

Conclusion:

This study revealed that pomegranate, ginger, garlic, ajwain, and cumin produced a harmonic churna, each of which functioned synergistically to produce the greatest possible therapeutic impact for antacid action. The churna developed for this investigation functions similarly to sodium bicarbonate, a common antacid. Patients

with GERD may use this herbal churna to improve the physiology of their GIT and digestive system and avoid the negative effects of synthetic medications.

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