



**FORMULATION AND EVALUATION OF HERBAL SUSPENSION FOR THE
TREATMENT OF IRRITABLE BOWEL SYNDROME**

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ABSTRACT

Irritable bowel syndrome (IBS) is the most prevalent functional gastrointestinal disorder noted in the general population worldwide. Its chronic nature, signs and symptoms which vary periodically from mild to severe have many negative effects on the quality of life for the sufferer; therefore the appropriate treatment of these patients is highly important. Patients should be informed by their doctors that the nature of the disease is benign, and educated on how to deal with and control symptoms of the disease. Herbal drugs are also one of the major classes of over the counter drugs used by patient considering its safety. Hence, in present study we attempted to prepare two formulations, one is aluminium hydroxide suspension and second is combination of calcium carbonate and magnesium oxide suspension as well as compares this by marketed formulation through IBS activity using in vitro methods viz- acid-Neutralizing capacity and buffering capacity. From the results of present study, it may be concluded that our both formulations show good physicochemical properties for the treatment of IBS.

Keywords: Intestinal bowel syndrome (IBS), Herbal drug, Formulation, Suspension

INTRODUCTION

Irritable bowel syndrome (IBS) is a persistent, sometimes crippling, and incredibly common condition of the relationship between the stomach and the

brain (previously called functional gastrointestinal disorders) [1,2]. The interplay of psychological, behavioral, psychosocial, and environmental elements might lead to

the complex of symptoms. Incomplete knowledge exists on the pathophysiology of IBS, which appears to have several factors [3]. Incomplete knowledge exists on the pathophysiology of IBS, which appears to have several factors. Studies indicate that luminal variables (such as nutrients, gastrointestinal bacteria, and the epithelial the mucosal immune system, and the barrier [4]. IBS sufferers can be classified into groups based on whether their symptoms are predominately constipation or diarrhoea [5]. Along with diarrhoea and constipation, IBS symptoms include bloating, cramping, and stomach discomfort. Coriander prevents bacterial overgrowth that causes IBS symptoms and offers defence against gut infections like *E. coli* [6, 7]. An ayurvedic herbal preparation known as triphala contains dried fruits from the plants *Terminalia chebula* (black myrobalan), *Terminalia bellerica* (bastard myrobalan), and *Phyllanthus emblica* in equal amounts (emblic myrobalan or Indian gooseberry). Triphala is very much helpful if constipation is primary symptom [8, 9]. Chebulic acid, Chebulinic acid, gallic acid, ellagic acid, terchebin, terfavin A are among the tannins, flavonoids, starches, amino acids found in abundance in the fruits of *T.chebula* [10]. Fruits from *Terminalia bellerica* are mostly composed of glucoside

(bellericanin) gallo-tannic acid, resins and a greenish yellow oil, ellagic acid, lignans, 7-hydroxy 3'4' (methylenedioxy) flavone and anolignan B [11]. The fruits of *P.emblica* composed of significant levels of ascorbic acid. The high concentration of ellagitannins in amla, including emblicanin A, emblicannin B, punigluconin, pendunculagin, cause of the fruit's overall bitterness. Additionally these fruits include phllanemblinin A, punicafolin, phyllembin, other polyphenols such flavonoids, kaemferol, ellagic acid, and gallic acid [12].

MATERIALS AND METHODS

Plant material:

The standardized plant material was extracted from senna leaves, coriander seeds, triphala churna powder.

Drugs and chemicals:

Aluminium hydroxide gel, sorbitol, methyl paraben, propyl paraben, sodium saccharin, peppermint oil, alcohol, purified water, magnesium oxide, calcium carbonate, mannitol.

Phytochemical screening:

The phytochemical components such as flavonoids, phenolics, alkaloids, glycosides, sugars, fixed oils, tannins, terpenoids, steroids, and saponin were detected in plant extract by using standard phytochemical identification tests (Table 1).

Table 1: Chemical Constituents In Coriander, Senna And Triphala Churna

S. No.	Chemical constituent	Coriander	Senna	Phyllanthus emblica	Terminalia bellerica	Terminalia chebula
1.	Alkaloids	-	-	+	+	+
2.	Glycosides	-	+	+	-	-
3.	Terpenoids	+	-	-	-	+
4.	Tannins	-	-	+	+	+
5.	Flavonoids	-	-	+	+	+
6.	Saponins	-	-	-	+	-
7.	Fixed oils	Nil	Nil	+	-	+
8.	Carbohydrates	Nil	Nil	+	+	-
9.	Steroids	Nil	Nil	-	-	+

PROCEDURE

Formulation-1:

Required amount of suspending agent and sorbitol was taken in a beaker and dissolved in purified water. Required amount of methyl paraben, propyl paraben, peppermint oil and sodium saccharin was dissolved in alcohol. Then the required amount of senna and coriander was added and finally alcohol phase dissolved in water phase and make up the volume with purified water up to 100ml (Table 2).

Formulation- 2

Required amount of suspending agent and sorbitol was taken in a beaker and dissolved in purified water. Required amount of methyl paraben, propyl paraben, peppermint oil, and sodium saccharin was dissolved in alcohol. Then the required amount of triphala churna powder was added and finally alcohol phase dissolved in water phase and make up the volume with purified water up to 100ml (Table 3).

Table 2: Formulation-1

S. No.	Name of the Ingredient	COMPOSITION (mg/ml)
1.	Senna	50
2.	Coriander	100
3.	Aluminium hydroxide	36
4.	Mannitol	7
5.	Propyl paraben	0.02
6.	Methyl paraben	0.2
7.	Sodium saccharin	0.05
8.	Peppermint oil	0.005
9.	Alcohol	1
10.	Purified water	q.s.up to 100 ml

Table 3: Formulation-2

S. No.	Name of the Ingredients	COMPOSITION (mg/ml)
1.	Triphala churna	540
2.	Magnesium oxide	18
3.	Calcium carbonate	18
4.	Mannitol	7
5.	Sodium saccharin	0.2
6.	Methyl paraben	0.02
7.	Propyl paraben	0.05
8.	Peppermint oil	0.05
9.	Alcohol	1
10.	Purified water	100

EVALUATION STUDIES [13]

• **Physical Test**

Over the course of six weeks, the suspensions were checked weekly for physical alterations such aggregation, caking, and crystal development.

• **Sedimentation Method**

By measuring the volume of the sediments in the suspension placed in the measuring cylinders at 5 day intervals for a 40 day period, the sedimentation volume of the suspensions was calculated. The following formula was used to compute the sedimentation volume (F)

$$F = V_u / V_0$$

F = Sedimentation volume

V_u = Ultimate height of the sediment

V_0 = initial height of suspension

• **Particle Size Analysis**

A microscopic approach was used to measure the suspensions' particle sizes.

Drops of each suspension were individually deposited on a slide and set on the microscope's (pre-calibrated) stage. 500 particles were measured for their diameters, and the mean particle size was calculated.

• **Rheological Method**

With the use of a Brookfield viscometer (Model DV-2 +LV, Brookfield Laboratories, Massachusetts, USA), the viscosities of the produced suspensions were assessed. A 600 ml beaker was used, which was large enough to completely submerge the spindle groove in the fluid. Since drag force is known to change with changes on the spindle size and rotational speed, the speed of rotation was altered to determine its impact on the viscosity values. At ambient temperature, the viscosity values at 10, 20, 50, and 100 rpm were calculated.

RESULTS:

Sedimentation Method

Table 4: Sedimentation volume of coriander and senna herbal suspension

S. No.	Time(days)	F = V_u/V_0
1.	0	1
2.	5	0.85
3.	10	0.81
4.	15	0.77
5.	20	0.77
6.	25	0.77
7.	30	0.77
8.	35	0.77
9.	40	0.77

Table 5: Sedimentation volume of triphala churna suspension

S. No.	Time(days)	F = V_u/V_0
1.	0	1
2.	5	0.87
3.	10	0.83
4.	15	0.79
5.	20	0.79
6.	25	0.79
7.	30	0.79
8.	35	0.79
9.	40	0.79

Particle Size Analysis

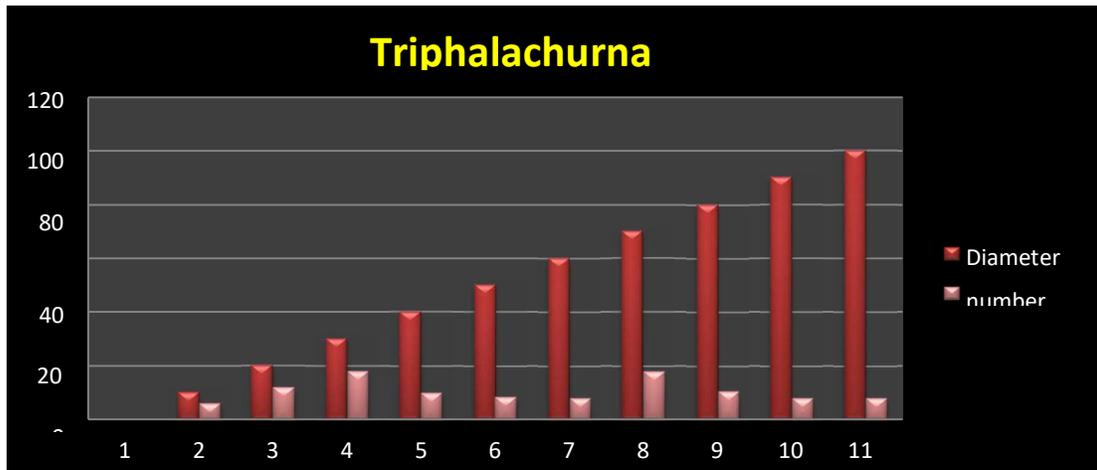


Figure 1: Microscopic method for the determination of particle size of triphalachurna suspension

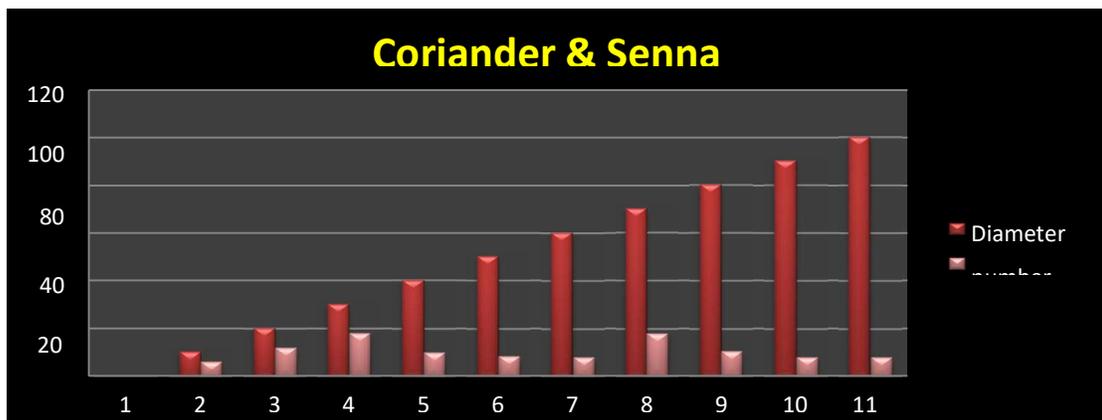


Figure 2: Microscopic method for the determination of particle size of coriander and senna suspension

Rheological Method

Table 6: Rheological Method of Triphalachurna Suspension

S. No.	Spindle speed (RPM)	Viscosity (centi poise)
1.	10	4440
2.	20	1355
3.	50	65.3
4.	100	92.4

Table 7: Rheological Method of Coriander and Senna Suspension

Sl.NO	Spindle speed (RPM)	Viscosity (centi poise)
1.	10	3526
2.	20	702
3.	50	86.9
4.	100	108.6

DISCUSSION

IBS is a gastrointestinal disorder which causes harmful effects, which may lead to severe diarrhoea, abdominal pain, bloating,

flatulence. To get relieved from this we have done two formulations. Which are aluminium hydroxide suspension in which senna coriander are the active ingredients

and second formulation is calcium carbonate and magnesium hydroxide suspension in which triphala churna is active ingredient. We have performed evaluation tests for suspensions and got satisfactory results.

CONCLUSION

The present studies revealed that presence of bioactive compounds such as flavonoids, steroids, terpenoids, alkaloids, glycosides and tannins, which are useful for the treatment of IBS. Liquid dosage forms have the upper hand over solid dosage forms in children and elder people due to polymer swallowing. Pharmaceutical suspension is one of the most trusted and acceptable formulations among other oral dosage forms because of flexibility, ease of administration. The herbal suspension was prepared by using coriander, senna and triphala churna with a suitable suspending agent and other excipients. By performing the evaluation tests, we have concluded that the suspension shows good physicochemical parameters

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