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Evaluation of natural suspending properties from *Sterculia urens*

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ABSTRACT

The present study was undertaken to evaluate the extract obtained from the stem bark of *Sterculia urens* as a suspending agent. A suspension of calcium carbonate was prepared using 2% w/v of *Sterculia urens* extract as suspending agent and it is evaluated for its stability using the parameters like, sedimentation volume, viscosity, redispersibility and pH. The suspending effect of *Sterculia urens* extract was compared with calcium carbonate suspensions prepared using 2% w/v of suspending agents such as acacia and tragacanth. The results obtained indicated that the *Sterculia urens* extract could be used as a suspending agent. It has low rate of sedimentation, high viscosity, slightly basic pH and is easily redispersible. These effects were comparable with that of the standard suspending agents like acacia and tragacanth. The extract isolated from the stem bark of *Sterculia urens* can be used as a pharmaceutical adjuvant.

KEYWORDS

Sterculia urens extract;
Suspending agent;
Calcium carbonate.

INTRODUCTION

Natural gums and resins are a class of plant exudates obtained from a large number of species. Since ages they were used in food processing, presently they are used in various process industries, namely food, pharmaceuticals, textiles, leather, oil exploration, etc. *Sterculia* genus trees are well known for producing an acidic polysaccharide with a high solution viscosity and gelation characteristics. *Sterculia urens* gum (karaya gum), has emulsifying, stabilizing and thickening properties[1]. The plant *Sterculis urens* is used to regularize menstrual disorders; leucoderma and peptic ulcer[2]. Gum karaya is one such natural gum that is exuded from *Sterculis urens* from the deciduous forest area and produced entirely in India[3]. Gum karaya is listed as 'generally regarded as safe' (GRAS) as a food stabilizer in the USA[4]. Karaya gum is a partially acetylated polysaccharide of the substituted rhamnogalacturono glycan (pectic) type[5]. The main constituent of the resin is a phlobatannin, containing 3 phenolic OH groups. A large part of the Karaya is used in the pharmaceutical Industry as a bulk laxative[6]. In current era of pharmaceutical suspension most of the suspending agents are of synthetic origin, having toxic effect.

So there is need to explore new suspending agents from natural origin. Researchers have explored the use of gum only; present work is an attempt to investigate extract obtained from bark of *Sterculia urens* as a suspending agent in pharmaceutical formulations.

MATERIALS AND METHODS

Samples origin

Plant was collected from dense forest at Khambakti Ghat, Satara. Species was authenticated by Dr.

U.S.Yadav, Department of Botany, Willingdon College, Sangli.

Preparation of the extract

The powdered plant material was extracted with 10% v/v chloroform water by maceration in a closed container for six days. This extract then squeezed through muslin cloth and the excess quantity of water was evaporated on water bath, evaporation was continued in shade

Preparation and evaluation of suspensions

2% Calcium carbonate suspensions in water were prepared using 2% of suspending agents[7] like acacia, tragacanth, and *Sterculia urens* extract. The calcium carbonate suspension was prepared by firstly sifting it through sieve no.80 in order to get uniform particle size; this was then levigated with glycerin (1:1 ratio). Suspending agents were finally added in required amounts[8]. The test suspension was evaluated using the parameters like, sedimentation volume, redispersibility, pH and viscosity and it was compared with acacia and tragacanth.

Determination of pH and viscosity

The suspensions were subjected for examining the pH at intervals of one week for 21 days using pH meter (DPH-500, Global Scientific, Mumbai).

The viscosity of suspension was measured with a Brookfield rotational viscometer (LV2, Brookfield Inc., USA) equipped with spindle no. 3[9]. The measurement was done at ambient temperature. The values expressed are mean ± SD of three observations

Sedimentation volume

Sedimentation volume is the most important parameter in the evaluation of suspension stability. Sedimentation volume F is the ratio of the ultimate height (Hu) of the sediment as a suspension settles in a cylinder under standard conditions to the initial height (Ho) of the total suspension. It was determined by keeping a measured volume of the suspension in a graduated cylinder in an undisturbed position for a definite period of time and noting the value of Hu and Ho[10].

TABLE 1: Determination of suspending property of *Sterculia urens*

Time in min.	Blank calcium carbonate F	Calcium carbonate + *Sterculia urens* F	Calcium carbonate + tragacanth F	Calcium carbonate + acacia F
0	1	1	1	0.9298
5	0.7766	0.9523	0.8846	0.8771
10	0.166	0.9404	0.8076	0.8421
15	0.0833	0.9166	0.7692	0.8421
20	0.0833	0.8809	0.7307	0.8421
25	0.08	0.869	0.6153	0.8421
30	0.08	0.866	0.5769	0.9298

Sedimentation volume (F) = Hu/Ho

Redispersibility

Redispersibility of a suspension can be estimated by shaking the suspension with the help of a mechanical device, which simulates the motion of human arm during shaking[2]. Fixed volume (50 ml) of the each suspension was kept in calibrated tubes, which were then stored at room temperature for various time intervals (5, 15, 25 days). At regular intervals (5, 15, 25 days) one tube was removed and shaken vigorously to redistribute the sediment and the presence of deposit if any is noted. The time taken to redisperse the sedimented suspension was recorded[11,12].

RESULT AND DISCUSSION

The average yield of dried extract obtained *Sterculia urens* was 15.8 % w/w. It is quite well understood that the better is the suspending medium the lesser the rate of sedimentation. The sedimentation volume profile of the suspensions with *Sterculia urens* extract, acacia and tragacanth are presented in TABLE 1 and figure 1.

The dispersed particles of Calcium carbonate prepared using *Sterculia urens* extract was found to sediment at lower rate than those prepared with tragacanth and that of acacia. Since the suspension produces sediment on storage, it must be readily dispersible so as to ensure the uniformity of the dose. Less is the time taken to redisperse the sediment, the better is the redispersibility. The suspension prepared by *Sterculia urens* extract showed better redispersibility than acacia and tragacanth on 5th and 15th day and on 25th day it was similar to the suspension prepared using acacia (TABLE 2).

Nowadays, the whole world is turning towards natural drugs and excipients. The natural materials do hold advantages over the synthetic materials because they are non toxic, less expensive and freely available. Fur-

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TABLE 2: Determination of pH, viscosity and redispersibility

Excipients	pH after storage for				Viscosity	Rate of redispersibility (cycles)		
2 % w/w	0th day	7th day	14 th day	21th day	(Centipose)	5 days	15 days	21 days
Sterculia urens	6.92±0.0057	6.82±0.0152	6.79±0.0251	6.78±0.0057	72 ± 1.37	10.66 ±0.577	17.00±1	23.00± 1
Tragacanth	7.09±0.0458	6.92±0.0550	6.79±0.0360	6.74±0.0321	58 ± 0.993	13.33± 0.577	20.00± 1	27.33± 0.577
Acacia	7.46±0.0152	7.37±0.0264	7.33±0.0115	7.25±0.01	52 ± 1.03	14.33± 1	19.33±0.577	32.00± 1

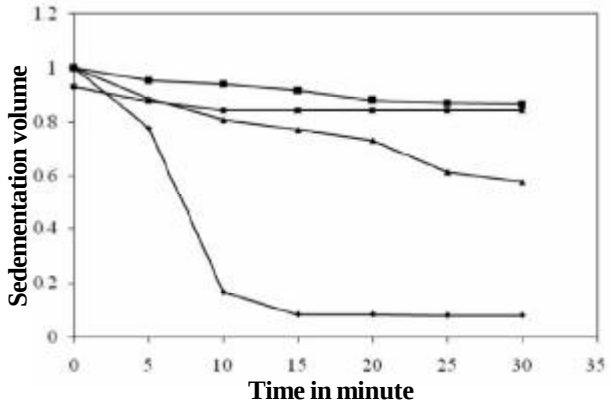

Figure 1: Determination of suspending property of *Sterculia urens*

ther they can be modified to obtain tailor made materials for drug delivery system and then can compete with the synthetic products available in the market. In this aspect, the hibiscus leaves extract tested for suspending effect has shown promising results and the effects were comparable with that of the standard suspending agents like acacia and tragacanth. Toxicity is not at all a concern for this extract because the effective concentration of the suspending agents in conventional dosage form normally does not exceed 2% of the formulation10 and earlier studies on this extract states that it is very safe even in higher doses.

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