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HERBAL RAPID RELEASE TABLETS MANUFACTURED FROM CORCHORUS OLITORIOUS LEAVES

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ABSTRACT

Corchorus olitorius (jute) is a native plant of tropical Africa and Asia, and has since spread to Australia, South America and some parts of Europe. Its leafy vegetable is popularly used in soup preparation and folk medicine for the treatment of fever, chronic cystitis, cold and tumors. To overcome the aforementioned disadvantages of traditional dosage forms a solid dosage form i.e. a tablet might be recommended. The first of this study was to formulate and manufacture a rapid release tablet dosage of *Corchorus olitorious* that would contain an amount of plant material equivalent to that found in its traditional liquid dosage forms and that would meet conventional pharmaceutical standards. A freeze-dried aqueous extract of *Corchorus olitorious* leaf was prepared and the physical properties of the extract powder were characterized in a preformulation study. Tablets containing 300mg of plant material were then manufactured and tested for uniformity of mass and content, disintegration, dissolution and microbial contamination using Indian Pharmacopoeia methods. The stability of the manufactured tablets under the conditions of 40oC & 75% relative humidity (RH), 25oC & room humidity and 5oC & 0% RH were also evaluated.

KEY WORDS

Corchorus olitorious, trolox, preformulation, freeze dried, solid dosage form, stability.

INTRODUCTION

Corchorus is a genus of about 40-100 species of flowering plants in the family Malvaceae, native to tropical and subtropical regions throughout the world. They are tall, usually annual herbs, reaching a height of 2-4 m, unbranched or with only a few side branches. The leaves are alternate, simple, lanceolate, 5-15 cm long, with an acuminate tip and a finely serrated or lobed margin. The flowers are small (2-3 cm diameter) and yellow, with five petals; the fruit is a many-seeded capsule. The green growth from one of the varieties of jute plants producing edible leaves that are used as a vegetable or food ingredient. Some jute plants produce very bitter leaves and are not considered edible. Common to Asian and African cooking, jute leaves are used to flavor soups, stews, teas, and vegetable dishes[1]. They are consumed for their flavor, their nutritional value as a source of beta-carotene, and in some regions for their use as an herbal remedy for various health concerns. The leaves are harvested from specific varieties of this plant for food while the stalks are used for industrial products such as rope, pulp, paper, fiber, and composites. Its leafy vegetable is popularly used in soup preparation and folk medicine for the treatment of fever, chronic cystitis, cold and tumors. A comparative study of the antioxidant properties of hydrophilic extract (HE) and

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lipophilic extract (LE) constituents of the leafy vegetable has been assessed. HE and LE of the leaf were prepared using water and hexane, respectively and their antioxidant properties were determined. HE had a significantly higher (P<0.05) 1,1-diphenyl-2-picrylhydrazyl radical-scavenging ability (aqueous, 9.6-84.4%; hexane, 2.0-20.4%), reducing power (aqueous, 0.67 mmol ascorbic acid equivalent/g; hexane, 0.49 mmol ascorbic acid equivalent/g) and trolox equivalent antioxidant capacity (aqueous, 2.3 mmol/g; hexane, 1.1 mmol/g) than LE; conversely, LE had a significantly higher (P<0.05) OH· scavenging activity (44.5-46.2%) than HE (11.6-32.3%), while there was no significant difference (P>0.05) in their Fe(II) chelating ability (HE, 57.7-66.7%; LE, 56.4-61.1%). The higher 1,1-diphenyl-2-picrylhydrazyl radical-scavenging ability, reducing power and trolox equivalent antioxidant capacity of the hydrophilic extract may be due to its significantly higher (P<0.05) total phenol (630.8 mg/100 g), total flavonoid (227.8 mg/100 g) and non-flavonoid polyphenols (403.0 mg/100 g), and its high ascorbic acid content (32.6 mg/100 g). While the higher OH· scavenging ability of LE may be due to its high total carotenoid content (42.5 mg/100 g). Therefore, the additive/synergistic antioxidant activities of the hydrophilic and lipophilic constituents may contribute to the medicinal properties of *C. olitorius* leaf[2].

Collection of the leaves and preparation of powder material

The leaves of fresh *Corchorus olitorious* were collected from the river Ganga Ghats Bittore. A sample of the collected plants was filed as a specimen in the herbarium, Botany Department, C.S.A.University for future reference purposes. The freshly collected plant material was separated from earthy and other foreign material. It was then washed with water and dried at 60oC in the oven until it retained a constant weight. After drying, the leaves were separated from the other portions of plant material and then ground into a fine powder using a mill. The resultant fine particle size of the plant material increased the surface area and thereby facilitated extraction.

Preparation of the dry aqueous extract

The extraction procedure used, as far as possible, resembled the methods mentioned in the literature for the preparation of traditional dosage forms. Initially, it was observed that extracting the powder using a powder: solvent ratio of 1:75 was very laborious and impractical. After further experimentation and evaluation of the yields obtained with powder: solvent ratios of 1:50, 1:40 and 1:35, it was decided to extract the rest of the material using a powder: solvent extraction ratio of 1:35 (i.e. 100 g powders to 3500ml distilled water). In each case the resultant powders obtained were weighed and the percent yield calculated, before the powders were placed in sealed brown glass bottles until it was further used[3].

Preformulation study

A preformulation study is the preceding study of the raw material to be used in the formulation development of a pharmaceutical dosage form. The results of the preformulation study should provide sufficient information to develop a standard and bioavailable dosage form (Banker, G.S., 1979). It should also provide an opportunity to select and determine the most appropriate excipients and the rational proportions of ingredients for the dosage form. The following 8 characteristics of the raw material were assessed in the preformulation study of the dried aqueous extract of *Corchorus olitorious*[9].

Yield of freeze dried aqueous extract

The yields of the freeze-dried extracts obtained from the dried powdered leaves of *Corchorus olitorious* are

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given in table 1. When 100 grams of plant powder was extracted with 7.5, 5, 4, and 3.5 liters of distilled water the variations in yield were however not statistically significant.

Table 1
Yields of the dried aqueous extracts of Sample Corchorus olitorious

Sample. No	Weight of the Dry powder(g)	Volume of water (L)	Yield of freeze dried Aqueous extract (g)
1	100	7.5	32.4
2	100	5.0	31.2
3	100	5.0	39.8
4	100	4.0	28.5
5	100	4.0	28.4
6	100	3.5	28.5
7	100	3.5	27.6
8	100	3.5	26.5
9	100	3.5	27.3
10	100	3.5	28.2
11	100	3.5	27.8
12	100	3.5	27.7
13	100	3.5	27.6
14	100	3.5	27.8
15	100	3.5	28.5

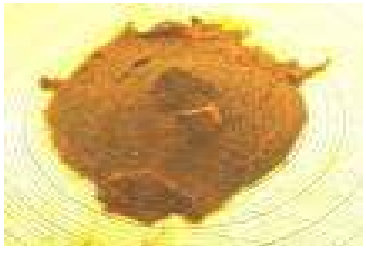
(A)  **(B)** 

Figure 1.1.
Freeze-dried aqueous extract of Corchorus olitorious leaves (A) and hygroscopic nature of powder after exposure to high humidity (B)

Organoleptic properties
The freeze-dried aqueous extract of *Corchorus olitorious* leaves was light brown in colour, had a characteristic odour and was bitter in taste and irregular in shape and size. Due to the hygroscopic

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nature of this product it however rapidly changed in colour (to dark brown) and physical appearance.

Particle size and shape

The results of the determination of the particle size of the *Corchorus olitorious* powder, Tabletose, starch and other excipients are given in table 2. Ninety eight percent (by weight) of the dried aqueous extract of *Corchorus olitorious* leaves passed through the 355 µm size sieve and only 9 % passed through the 180 µm sieve. Using the Indian Pharmacopoeia specifications, the particle size of the powders that were used in the preformulation study can be described as indicated in table 2.

Table 2.
Particle sizes of the components of tablet dosage form

Sample	Grade
Corchorus olitorious	Moderately Fine
Starch 1500	Very Fine
Explotab	Very Fine
Emcompress	Fine
Tabletose	Fine
Magnesium stearate	Very Fine
Avicel	200 µm
Talc	Very Fine

Flowability

The results of the flowability test for the dried aqueous extract of *Corchorus olitorious* powder, Tabletose and Starch 1500 are given in tables 3, 4 and 5, respectively. According to the Carr's Index, the theoretical lower limit of the angle of repose for powders that are suitable for direct compression is 25^{o}. Powders that have lower values of angles of repose show better flow. Because the cohesive force among particles of powder gives rise to the resistance to particle flow, the cohesive force can be correlated with the angle of repose. As the angle of repose increases the flow of particles decreases due to increase in the cohesive forces among the particles. The results given in tables 3 to 5 indicate that the dried aqueous extract of *Corchorus olitorious* powder showed passable flowability. The Tabletose and Starch 1500 also possessed good flowability properties. Even though the active ingredient showed medium flowability the addition of excipients such as the Tabletose, Emcompress, etc improved the flowability properties (to free flowing).

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Table 3.
Flowability of following Corchorus olitorious, Tabletose, Starch 1500

Flowability	Dried aqueous extract of *Corchorus olitorious*			Tabletose			Starch 1500		
Sample No	Height (cm)	Radius (cm)	Angle of repose (o)	Height (cm)	Radius (cm)	Angle of repose (o)	Height (cm)	Radius (cm)	Angle of repose (o)
1	2.8	3.85	37.02	1.9	3.3	30.929	2.2	3.4	33.9
2	3.2	4.05	38.35	1.8	3.2	29.457	2.0	3.4	30.4
3	3.5	4.15	40.46	1.9	3.35	29.567	2.2	3.3	33.6
4	2.8	4.25	33.87	1.8	3.2	29.457	1.9	3.45	28.8
5	3.2	4.07	38.75	1.7	3.35	26.632	1.8	3.45	27.5
6	2.8	4.12	34.53	1.9	3.2	30.376	2.0	3.5	29.9
7	2.8	3.75	36.94	1.9	3.25	30.405	2.0	3.5	29.7
8	3.4	4.18	36.29	2.0	3.1	32.760	2.1	3.3	32.4
9	3.6	3.75	43.82	2.0	3.25	31.639	2.2	3.45	32.5
10	3.4	4.19	39.66	2.0	3.2	32.035	2.3	3.5	32.3
Ave	**3.1**	**4.65**	**37.736**	**1.89**	**3.24**	**30.248**	**2.01**	**3.425**	**31.08**
SD	**± 0.28**	**± 0.176**	**± 3.506**	**± 0.29**	**± 0.13**	**±1.7610**	**± 0.15**	**±0.0754**	**± 2.21**

Density and Compressibility studies

The results of the experiments to determine the densities and indices of compressibility of the dried aqueous extract of *Corchorus olitorious*, the Tabletose and Starch1500 are given in tables 6, 7 and 8, respectively.

Table 4.
Densities and index of compressibility

Sample No	*Corchorus olitorious*			Tabletose			Starch 1500		
	Loose density (g/ml)	Packed density (g/ml)	Carr's Index	Loose density (g/ml)	Packed density (g/ml)	Carr's Index	Loose density (g/ml)	Packed density (g/ml)	Carr's Index
1	0.6213	0.6783	6.2	0.6710	0.6281	9.0	0.6543	0.6360	0.6433
2	0.6675	0.7293	9.5	0.6829	0.6426	9.2	0.6768	0.6790	0.6874
3	0.6050	0.6540	9.0	0.4712	0.6284	9.1	4.4544	4.354	4.465
Ave	**0.6420**	**0.6872**	**8.233**	**0.4750**	**0.6330**	**9.1**	**0.6407**	**0.6846**	**4.366**

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SD	**±0.012**	**±0.049**	**±1.778**	**±0.0068**	**±0.0082**	**± 0.1**	**±0.004**	**±0.0049**	**± 0.0575**

According to the Carr's compressibility indices found, the dried aqueous extract of *Corchorus olitorious*, Tabletose and Starch1500 powders all individually had adequate compressibility characteristics for tabletting. It was thus concluded that mixtures of the active ingredient and the excipients would also have satisfactory properties (flowability and compressibility) for direct compression.

Ash values studies

The ash value indicates, to some extent, the amount of care taken in the preparation of the drug. In herbal medicine ash values can be considered as quality standards to indicate purity or possible adulteration. The total ash and acid insoluble ash values for *Corchorus olitorious* leaf powder are given in table 5.

Table 5.
Total ash and acid insoluble ash values for Corchorus olitorious leaf powder

Sample No	Weight of the dried leaves powder (g)	Percentage of Total ash	Weight of Acid Insoluble ash (g)	Percentage of Acid-Insoluble ash
1	2.0221	9.005	0.0234	1.157
2	2.0407	8.599	0.0306	1.499
3	2.0071	8.674	0.0212	1.056
4	1.9620	8.603	0.0310	1.580
5	1.9985	8.356	-----	-----
6	1.9857	8.586	0.0316	1.591
7	2.0362	8.702	0.0237	1.163
8	1.9980	8.238	-----	1.562
9	1.9985	8.356	0.265	-----
Ave	**2.0605**	**8.585**	**0.0296**	**1.314**
SD	**± 0.008**	**±0.007**	**±0.005**	**±0.34**

Solubility studies

Solubility is another important property of the drug and one that determines the dissolution rate of the active ingredient. An active ingredient must be in the solution of gastric fluids, before it can be absorbed

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into the systemic circulation. Poor solubility and dissolution are undesirable properties of the active ingredient in oral solid dosage forms.

Table 6.
Aqueous solubility of dried aqueous extract of Corchorus olitorious dried leaf powder

Sample No	Weight of the Aqueous extract (mg)	Weight of the residue on filter paper (mg)	Weight of the soluble portion in the aqueous extract (mg)	Percentage of solubility
1	30.4	4.9	25.3	83.5
2	29.0	2.9	26.2	90.0
3	34.4	5.8	28.8	83.4
4	31.5	6.0	25.7	81.0
5	28.5	4.2	24.1	85.3
6	30.4	5.3	25.1	82.2
Ave	**30.71**	**4.85**	**25.86**	**84.25**
SD	**± 2.2301**	**± 1.1536**	**± 1.5983**	**± 3.1245**

Moisture content

These moisture content values for the aqueous powders did not specifically indicate the hygroscopic nature of the powders; it only refers to the percentage of moisture present in the powders that were used in the manufacture of the tablets. The moisture contents of various samples of the dried aqueous extract of *Corchorus olitorious*, Tabletose and Starch 1500, determined at 42 % relative humidity and 28.3oC, are given in table 7.

Table 7.
Moisture content of the dried aqueous extract of following

Sample No	Initial weight of aqueous extract (g)	% of moisture	Initial weight of Tabletose (g)	% of moisture	Initial weight of Starch1500 (g)	% of moisture
1	1.050	4.17	1.026	0.75	1.034	8.8
2	1.056	5. 83	1.064	0.74	1.036	8.7
3	1.116	4.89	1.071	0.47	1.087	8.2
4	1.163	4.89	1.073	0.38	1.089	8.4
5	1.013	4.88	1.082	0.46	1.080	8.7
6	1.069	5.79	1.042	0.48	1.026	8.4
Ave	**1.0703**	**5.0000**	**1.0656**	**0.4716**	**1.0706**	**8.48**

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S D	**±0.0544**	**±0.5469**	**±0.0136**	**±0.0647**	**±0.0178**	**±0.2639**

Microbial contamination tests

The results of the microbial contamination tests conducted on the *Corchorus olitorious* powder and extract are summarized in table 8 and shown in figures 2.1 to 2.2. Both *Pseudomonas aeruginosa* and *Staphylococcus aureus* was found in the *Corchorus olitorious* dried leaf powder, but not in the aqueous extract (figure 2.1 and 2.2). In fact none of the 4 objectionable microorganisms were found to be present in the aqueous extract. *E. coli* and *salmonella* were also not present in the leaf powder.

Table 8.

Absence test for four objectionable bacteria in dried leaf powder of Corchorus olitorious

Sample	***Pseudomonas***	***Staphylococcus***	***Salmonella***	***E.coli***
Leaf Powder	Positive	Positive	Negative	Negative
Aqueous Extract	Negative	Negative	Negative	Negative

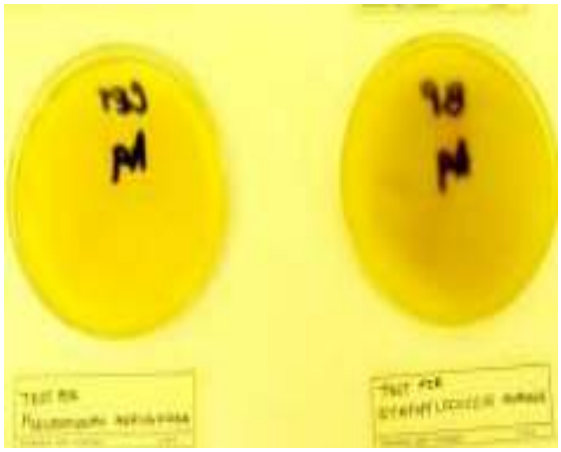

Fig. 2.1

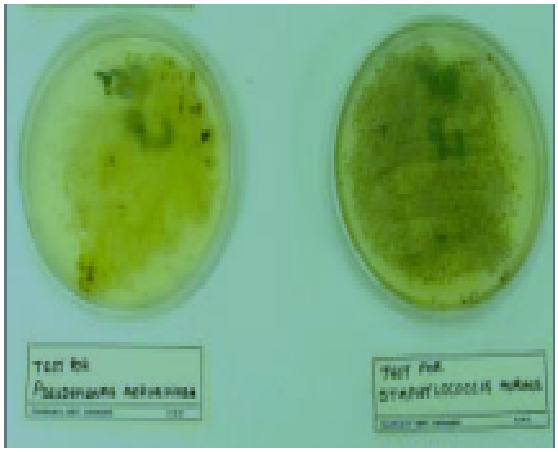

Fig2.2

Manufacture of the trial tablets

Tablets containing the *Corchorus olitorious* extract were manufactured according to the formulas mentioned in table 9. For each formula forty tablets were manufactured. The most important factor that had to be considered was the relative humidity at the manufacturing site. The first step in the manufacturing process was to sieve the

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active ingredient and the excipients and to isolate the powder with the desired particle size that was determined during the preformulation study. Then, weighed amounts of each component of the formula ware uniformly mixed in a blender. The tablet mix was then transferred to a single punch tablet press having a 9mm diameter punch and die set, for the manufacture of the tablets. The desired tablet weight was achieved by adjusting the fill volume of the die.

Table 9.
Various formulations used for manufacture of trial tablets

Ingredient	Amount of various excipients in various Formulae (mg)						
	1	2	3	4	5	6	7
Aq. Extract	300	300	300	300	300	300	300
Tabletose	30	65	80	----	50	60	65
Emcompress	----	35	----	----	40	25	30
Starch 1500	75	----	----	----	----	----	----
Explotab	15	20	10	30	12	12	20
Aerosil	3	5	5	10	5	4	4
Avicel PH200	3	15	25	75	30	30	23
Magnesium stearate	4	-----	-----	6	-----	3	5
Sodiumlaurylsulphate	----	5	-----	10	8	8	2
Talc	---	---	10	---	5	8	8
Vanilla	----	----	----	----	----	----	4
Total	**430**	**446**	**431**	**431**	**450**	**450**	**451**

Mass uniformity and size & shape test of Corchorus olitorious tablets

The weight, diameter and thickness of the 20 tablets of the final manufactured batch are given in table 10. The average diameters of the tablets were 10mm and the variation in thickness with in the 5% deviation limit. 65

Table 10.
Mass, size & shape of the manufactured tablets of Formula 7

Serial No of the Tablet	Weight of the tablets(mg)	Weight of the Tablets (mg)	Diameter (mm)	Thickness (mm)
1	463	443	10	4.2
2	464	457	10	4.2
3	475	452	10	4.2
4	447	435	10	4.05
5	447	458	10	4.25
6	453	466	10	4.3

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7	453		451	10	4.2
8	453		449	10	4.2
9	449		447	10	4.15
10	447		473	10	4.35
11	447		463	10	4.3
12	447		456	10	4.25
13	447		444	10	4.15
14	453		453	10	4.25
15	453		444	10	4.15
16	453		463	10	4.3
17	451		459	10	4.2
18	451		442	10	4.2
19	467		467	10	4.3
20	467		441	10	4.15
Mean	**455**				
Mean+5%	**477.7**	**Ave**	**453.1**	**10**	**4.217**
Mean-5%	**432.3**	**SD**	**±10.15**	**0**	**±0.0712**
SD	**8.27**				

Hardness test

The hardness values also varied greatly, from 128N to 198N, and the physical properties of the aqueous extract of *Corchorus olitorious* were probably primarily responsible for this. It could thus be concluded that the tablets exhibited very high hardness values, and this could very possibly impact on the disintegration and dissolution of the tablets.

Table 11.

Hardness of the tablets manufactured from Formula 7

Serial No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Ave**	**SD**
Hardness	191	198	183	174	166	128	131	146	132	159	**160.8**	**25.83**

Friability test studies

The results for the friability test were as follows:
Initial weight of the 10 tablets = **4.565g**
End weight of the 10 tablets after test = **4. 450g**
Difference in weight of 10 tablets after test = **0.015g**
Percentage difference in weight (friability) = **0.315 %**

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i.e. there was less than 1% change in weight.

The general specification is that a change in weight of less than 1% is required to pass the friability test. The tablets manufactured from formula 7 thus passed the friability test, 67 indicating that the tablets would withstand the physical rigors expected in handling and, importantly, that chipping, cracking, and breaking of the tablets would not occur.

Disintegration test studies

The results indicating the disintegration characteristics of the tablets are shown in table 21. The tablets manufactured from formula 7 disintegrated within 9.2 min to 11.3 min. Despite the high hardness values, the tablets thus still showed acceptable disintegration characteristics. Possibly the magnesium stearate in the formulation reduced the wetting of the tablet material with the disintegration medium. The inclusion of the Explotab and sodium lauryl sulphate did not, as was expected, reduce the disintegration time to 5 minutes and below. Nevertheless, it seemed that the extreme hardness of the tablets did not impact negatively on their disintegration.

Dissolution test studies:

A wavelength scan of a 0.01% solution of the aqueous extracts of *Corchorus olitorious* indicated that the wavelength of the maximum absorption for the plant material was 282nm.. Using these values the amounts of tablets dissolved after various times in the dissolution medium were calculated and the percent (%) extract released at the times estimated.

Table 12.
Disintegration time for the tablets manufactured from Formula 7

Serial No	Tablet Weight (mg)	Disintegration time (Sec)
1	439	553
2	447	615
3	453	625
4	467	638
5	464	630
6	463	630
7	453	620
8	447	615
9	447	620
10	475	680
11	467	642
12	447	610
Ave.	**455.75**	**623**

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SD	**11.06**	**27.7**

Table 13.
Absorbance readings of fixed concentrations of dried aqueous extracts Corchorus olitorious dissolved in distilled water.

Absorbance (Abs)	**Concentrations of the dried aqueous extracts of *Corchorus olitorious***			
	25%	**50%**	**75%**	**100%**
Sample 1	0.2190	0.4051	0.5746	0.7916
Sample 2	0.1877	0.4119	0.6340	0.8201
Sample 3	0.2028	0.4213	0.6422	0.8295
Sample 4	0.1985	0.4213	0.5900	0.8378
Sample 5	0.2139	0.4317	0.6534	0.8363
Ave	**0.2043**	**0.4182**	**0.6188**	**0.8230**
SD	**± 0.0124**	**± 0.0105**	**± 0.0344**	**± 0.0189**

Table 14.
Dissolution of dried aqueous extract released from tablets (n=6) into distilled water

Time (min)	**Amount of aqueous extract of *Corchorus olitorious* released into dissolution medium at various times (%)**							
	Tablet 1 (%)	**Tablet 2 (%)**	**Tablet 3 (%)**	**Tablet 4 (%)**	**Tablet 5 (%)**	**Tablet 6 (%)**	**Ave**	**SD**
0 - 1	2.780	2.800	5.900	12.480	5.850	8.120	6.321	3.64
15	49.150	44.940	48.120	45.920	45.150	43.850	46.18	2.03
30	78.710	69.050	78.849	71.660	67.910	64.780	71.83	5.82
45	94.950	83.990	89.900	81.074	81.816	80.258	85.33	5.85

Stability studies

The organoleptic and various physicochemical properties of the manufactured tablets were monitored while they were stored under 3 different sets of condition. The tablets stored at site A had lost their physical properties after 10 days of beginning of the study.

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Table 15.

Variations in the physical properties of the stored tablets at 2 different conditions

Site & Time	Physical properties of tablets in stability studies					
	Diameter (mm)	Thickness (mm)	Weight (mg)	Hardness (N)	Moisture (%)	Disintegration time (Sec)
Site B After10 days	+0.075	+0.100	+13.25	Lost	+2.81	+235
20 days	+0.087	+0.112	+14.25	Lost	+3.06	+267
30 days	+0.100	+0.162	+1475	Lost	+3.14	+311
40 days	+0.150	+0.100	+22.00	Lost	+4.39	+335
Site C After 10 days	+0.075	+0.050	+0.25	+10	+0.05	+35
20 days	+0.075	+0.012	-1.5	+14	0	+125
30 days	+0.05	+0.012	-2.25	+13	0	+121
40 days	+0.05	+0.012	-6.75	+15	0	+116

Table 16.

Changes in the organoleptic properties of Corchorus olitorius tablets stored at 3 different conditions

Site &Time	Organoleptic properties of tablets		
	Colour	Odour	Stickiness
Site A After 1st day	Light Brown	Mixed odour of Vanilla Aq. extract	No Stickiness
10 days	Turned to dark	Vanilla odour decreased	Become like Gum
20 days	Turned to dark	Aq. Extract odour increased	Sticky like Paste
30 days	Turned to dark	Pungent Aq. Extract odour	Melted like Slurry
40 days	Turned to dark	Pungent Aq. Extract odour	Melted like Slurry
Site B After 1st day	Light Brown	Mixed odour of Vanilla Aq. extract	No Stickiness
10 days	2 Tablets shaded	No Change	Slightly Sticky
20 days	3 Tablets shaded	Vanilla odour decreased	More Sticky
30 days	All tablets shaded	Aq. Extract odour increased	Much More Sticky
40 days	Turned to dark	Pungent Aq. Extract odour	Gum like & Soften
Site C After 1st day	Light Brown	Mixed odour of Vanilla Aq. extract	No Stickiness

10 days	No Change	No Change	No Stickiness
20 days	No Change	No Change	No Stickiness
30 days	1 Tablet slightly shaded	No Change	No Stickiness
40 days	No significant change	No Significant Change	No Stickiness

In this instability was most likely due to the highly hygroscopic nature of the active ingredient i.e. dried aqueous extract of the plant. Substantial improvements must thus be made to the tablets manufactured from formula 7 in order to obtain optimally stable tablets of *Corchorus olitorious*.

DISCUSSION AND CONCLUSION

The dried aqueous extract powder of the *Corchorus olitorious* leaves had flowability, compressibility, and particle size and shape properties that were quite satisfactory under low relative humidity conditions (<40% RH), but it was very hygroscopic at higher relative humidity conditions (above 40 % RH). The freeze-dried aqueous extract and tablet prepared from the aqueous extract from the boiling water, passed the microbial contamination test limits specified in Indian Pharmacopoeia 1996 could be prepared from the plant leaf powder. Certainly further research to improve the tablet dosage form with regards to the taste, hygroscopicity, shelf-life stability and safety and efficacy (i.e. clinical trials) would benefit the growing number of users, producers and regulators of such plant dosage forms.

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