

Lallemantia reylenne seeds as superdisintegrant: Formulation and evaluation of nimesulide orodispersible tablets

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Abstract

Aim: Orodispersible tablets also known as fast dissolving tablets disintegrate instantaneously within the mouth and thus can be consumed without water. The present study was aimed to formulate orodispersible tablets of nimesulide by using *Lallemantia reylenne* seeds as natural superdisintegrant. **Materials and Methods:** Powdered *Lallemantia reylenne* seeds were characterized for powder flow properties (bulk density, tapped density, carr's consolidation index, hausner ratio, angle of repose), swelling index, viscosity, pH, and loss on drying. The prepared tablets were evaluated for different tablet parametric tests, wetting time, water absorption ratio, effective pore radius, porosity, packing fraction, *in vitro* and *in vivo* disintegration time, *in vitro* dissolution and stability studies. **Results and Discussion:** Increase in *Lallemantia reylenne* concentration had an appreciable effect on tablet hardness and friability which clearly indicated binding potential of the seeds. Water absorption ratio increased with increase in *Lallemantia reylenne* concentration from batch A1 to A4. Water uptake coupled natural polymer swelling could be the most probable mechanism for concentration dependent reduction in disintegration time by the *Lallemantia reylenne* seeds. Porosity of the formulated tablets was found to increase from batch A1-A4. The *in vitro* disintegration results were in line with *in vivo* disintegration results. **Conclusion:** It could be concluded that *Lallemantia reylenne* seeds could be used as natural superdisintegrant in the formulation of orodispersible tablets.

Key words: Fast disintegrating tablets, *Lallemantia reylenne*, superdisintegrant

INTRODUCTION

Plant products nowadays are widely used as an alternative to synthetic products due to ease of local accessibility, lower prices as compared to synthetic products, biocompatible, biodegradable nature, and environment friendly nature. The oral route of drug delivery is the most preferred route of administration of drugs for systemic action. The tablet is the most widely used oral dosage form because of its convenience

in terms of self-administration, compactness, non-invasive, and economical to manufacture. About one third of the population including paediatrics, bed ridden patients, and geriatrics face swallowing problems related to solid oral dosage forms resulting in poor compliance to drug therapy. Novel drug delivery systems are aimed to produce effective drug therapy with better patient compliance, efficacy, and safety. Fast disintegrating drug delivery systems offer a solution to overcome swallowing problems of these patients. Orodispersible tablets are commercially prepared by direct compression technology and makes use of superdisintegrants, which when placed on the tongue disintegrates instantaneously and the drug gets dissolved or dispersed in saliva.^[1] The technologies used for preparation of orodispersible tablets include lyophilization,^[2] moulding,^[3] direct compression,^[4] cotton candy process,^[5] spray drying,^[6] sublimation,^[7] and nanonization.^[8] These techniques are based on the principles of increasing porosity and/or addition of superdisintegrants and water soluble excipients in the tablets, which aid in disintegration of tablets within seconds.^[9] Synthetic superdisintegrants such as sodium starch glycolate, cross carmellose sodium, and crosspovidone have swelling and capillary based action, which aids in quick disintegration of the tablet. Another mechanism of super disintegration of tablets

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is by the liberation of carbon dioxide from chemical reaction between citric acid/tartaric acid with sodium bicarbonate, sodium carbonate, potassium bicarbonate.^[10] Indion 414 an ion exchange resin has also been explored for their superdisintegrant property, which acts by swelling mechanism.^[11] Synthetic superdisintegrants are prepared from chemical treatment, which increases their cost and ultimately will make the formulation costly. The current trend is use of natural superdisintegrants. Some natural superdisintegrants explored by researchers include plantago ovate,^[12] mango peel pectin,^[13] *Rhodiola rosea*,^[14] *Ocimum americanum*,^[15] and *Aloe vera*.^[16]

Nimesulide (4'-nitro-2'-phenoxy methane sulfonamide) is a weakly acidic non-steroidal anti-inflammatory drug (BCS class II), is widely used in the treatment of the management of a variety of painful and inflammatory conditions like post operative pain, primary dysmenorrhea, and painful osteoarthritis. It shows high anti-inflammatory, antipyretic, and analgesic activities in addition to low toxicity, a moderate incidence of gastric side effects, and a high therapeutic index.^[17]

Lallemantia reylenne (Family: Lamiaceae) also known as Tukhmalanga in India is an annual herb cultivated widely in Northern India for its highly medicinal and mucilaginous seeds, which when soaked in water and then putting the layer on boil can help to cure boil pain and bursting of boil.^[18] Owing to the extensive swelling properties of *Lallemantia reylenne* seeds, the purpose of the present study was to evaluate *Lallemantia reylenne* seeds as a superdisintegrant in the formulation of nimesulide orodispersible tablets. *Lallemantia reylenne* seeds powder was evaluated for powder flow properties (bulk density, tapped density, angle of repose, Carr's consolidation index, hausner ratio), swelling index, and loss on drying. The prepared batches of orodispersible tablets (using *Lallemantia reylenne* and standard superdisintegrant) were evaluated for parametric tests of tablets (thickness, diameter, hardness, tensile strength, and friability), wetting time, water absorption ratio, effective pore radius, porosity, packing fraction, moisture uptake studies, *in vitro* and *in vivo* disintegration time, *in vitro* release, stability studies, and similarity factor (f_2) was computed in comparison with the marketed formulation based on *in vitro* release data.

MATERIALS AND METHODS

Materials

Nimesulide and croscarmellose sodium were received as gift samples from Park Pharmaceuticals, Baddi, India. Avicel PH-101 was procured from Sigma Aldrich, USA. Talc and magnesium stearate were purchased from S. D. Fine Chemicals Ltd. Mumbai, India. *Lallemantia reylenne* seeds were purchased from Yarrow Chem, Mumbai, India. *Lallemantia reylenne* seeds were powdered and passed through 60-mesh sieve for being used in the research work. All other chemicals and reagents were of analytical grade and were used as such.

Characterization of *Lallemantia Reylenne* seeds

Evaluation of powder flow properties

The *Lallemantia reylenne* powdered seeds were evaluated for flow properties including bulk density, tapped density, angle of repose, Carr's compressibility index, and Hausner ratio.

Swelling index

The study was carried out using a 100 ml stoppered graduated cylinder. The initial bulk volume of 1 gm powdered seeds was noted. Water was added in sufficient quantity to produce 100 ml of a uniform dispersion. The sediment volume of the swollen mass was measured after 24 hour, stored at room temperature. The swelling index was calculated as

$$\text{Swelling index} = \frac{V_2 - V_1}{V_1} * 100$$

where, V_1 and V_2 are initial volume of material before hydration and volume of hydrated material, respectively.

Viscosity

Viscosity of 1% solution of (w/v) *Lallemantia reylenne* seeds was measured at $37 \pm 1^\circ\text{C}$ using searle type viscometer, DV-2 +LV Brookfield Viscometer, USA with spindle number 62 at different rpm.

Determination of pH

The pH of 1% solution of (w/v) powdered *Lallemantia reylenne* seeds was determined using digital pH meter (EI products, India) at 37°C .

Loss on drying

Loss on drying technique (LOD) is used to determine high levels of moisture or solvents present in the sample. The material sample was weighed (W_1) and heated in an oven for 2 hrs. Sample was cooled in the dry atmosphere of a desiccator, and then reweighed (W_2). % LOD was calculated by

$$\% \text{ LOD} = (W_1 - W_2 / W_1) * 100$$

Preparation of tablets

Orodispersible tablets containing 100 mg of nimesulide were prepared by direct compression method and the different formulae employed in the study are shown in Table 1. The drug and excipients were passed through 60 mesh sieve ensure better mixing. Avicel PH 101 was used as a directly compressible diluent. The directly compressible mixture were compressed using mutipunch tableting machine (AK Industries, India) fitted with 8.40 mm flat faced punch and die set possessing 50 ton compression force. Before compression, the surface of die and punch were lubricated with magnesium stearate. About 300 tablets were made for each batch.

Evaluation of tablets

Diameter and thickness

A calibrated vernier calliper (Indian calliper industries, Ambala, India) was used to evaluate diameter and thickness of tablets.

Table 1: Composition of Nimesulide orodispersible tablet formulations

Ingredients (mg)	A1	A2	A3	A4	B1	B2	B3	B4
Nimesulide	100	100	100	100	100	100	100	100
<i>Lallemantia reylenne</i> powder	6.25	12.5	18.75	25	-	-	-	-
Croscarmellose sodium	-	-	-	-	6.25	12.5	18.75	25
Avicel PH 101	138.75	132.5	126.25	120	138.75	132.5	126.25	120
Talc	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Magnesium stearate	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Total weight	250	250	250	250	250	250	250	250

Hardness

The hardness of the tablets was determined by using Monsanto hardness tester (Pharma Chem Machineries, Mumbai, India). A tablet hardness of about 4–5 kg/cm² is considered adequate for mechanical stability.

Friability

As per USP 30-NF 25, twenty six tablets were taken, which corresponded to 6.5 g weight. They were placed in a Roche friabilator and were rotated at 25 rpm for 4 minutes. The tablets were taken out, dedusted, and reweighed. The percentage friability of the tablets was calculated by the formula,

$$\text{Percentage friability} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Measurement of tablet tensile strength

The tablet tensile strength is the force required to break a tablet by compressing it in the radial direction and is measured using a Monsanto hardness tester. For measuring the hardness of the tablets, the plunger of the hardness tester is driven down at a speed of 20 mm/min. Tensile strength for crushing (T) is calculated using equation:

$$T = 2F / \pi dt$$

Where F is the crushing load, and d and t signify the diameter and thickness of the tablet, respectively.

Weight variation test

A total of 20 tablets from each batch were subjected to weight variation test. As per Indian Pharmacopoeia standards, the tablets should be within the specified limits, i.e., $\pm 5\%$ of average weight.

Wetting time

A piece of tissue paper (10.75×12 mm) folded twice was placed in a culture dish (d = 6.5 cm) containing 6 ml of simulated saliva (phosphate buffer pH 6.8). A tablet was carefully placed on the surface of tissue paper and the time required for simulated saliva to reach the upper surface of the tablet was noted as the wetting time.^[19]

Water absorption ratio

Test was done with the same procedure as that of wetting time. In this test, initial weight of tablet was noted before placing on petri dish. After complete wetting the wetted tablet was then weighed. Water absorption ratio, R was determined using the equation,

$$R = 100 (W_a - W_b) / W_b$$

Where, W_a is weight of tablet after water absorption and W_b is weight of tablet before absorption.^[19]

Effective pore radius

Effective pore radius (R_{eff,P}) of the powder blend was determined using method reported by Rana et al.^[20] In short a micropipette tip (2 ml, transparent) was completely filled with powder and weighed (W_f). Then n-hexane (surface tension (γ) 18.4 mN/m) was poured dropwise on bedtop till the solvent filtered out at the bottom of the tip. The tip was reweighed (W_i). The experiments were repeated 3 times.

$$R_{\text{eff,P}} = W_f - W_i / 2\pi\gamma$$

Porosity

Porosity is a measure of the void spaces in a material, and is a fraction of the volume of voids over the total volume. Its value ranges between 0–1, or as a percentage between 0–100%.

The porosity of the tablets was calculated as follows:

$$\epsilon = 1 - \frac{m}{\rho_{\text{true}} V}$$

where ρ_{true} is the true density of the mixture, m and V are the weight and volume of the tablet, respectively. The true density of the powder was determined using true density meter (SMART PYCNO 30). When helium gas is used, initially vacuum is necessary to remove air from the pores of the sample. After that purging with helium gas is done. Then the normal procedure is followed. Two pressure readings were used to calculate true density. Initially helium gas was pressurised in a known reference volume. This reading was taken as first pressure reading. Then the gas was allowed to pass to a sample cell containing the sample material, which resulted in pressure drop as compared to initial pressure and this dropped pressure was taken as second pressure reading. Then material volume was calculated from which true density was calculated.

Tablet packing fraction

The tablet packing fraction (P_p) is a measure of the degree of consolidation or compactness of the tablet. Tablet packing fraction was determined by the following method:

$$\text{Packing fraction (P}_p) = w / \pi r^2 t \rho$$

Where w is the weight of a tablet, r is radius, t is thickness, and ρ is the particle density.

Ten tablets were used in each measurement. The radius and thickness of tablets were measured using a vernier calliper. The apparent particle density of the drug powder was determined using liquid paraffin displacement method. Firstly, the weight of a specific

gravity (SG) bottle filled with liquid paraffin and the weight of the SG bottle containing a sample of the drug powder (1 g) was noted. Then the SG bottle was filled with liquid paraffin. The final weight was determined. The determination was performed in triplicate, and mean results were used in the calculation of P_f . If the packing fraction is very high, fluid is unable to penetrate in the tablet, which leads to slower disintegration.^[21]

In vitro disintegration time

Disintegration time for orodispersible tablets was determined using USP disintegration apparatus with simulated saliva as the disintegrating medium (Phosphate buffer pH 6.8, 900 ml at 37°C) at a constant frequency of between 28 and 32 cycles per minute through a distance of 50 to 60 mm. To comply the test, all tablets should disintegrate within 3 minutes as per official requirements.

In vivo disintegration time

In vivo disintegration time^[20] was judged on five healthy male volunteers, for each batch of orodispersible tablets. The purpose of study was previously informed to the. Prior to the test the volunteers were instructed to rinse their oral cavity with distilled water. Each volunteer was asked to place one tablet on the tongue and stopwatch was started immediately. Volunteers were strictly told not to chew or swallow the tablets, licking was allowed. The test was concluded when there were no lumps left in the oral cavity, after which they were told to rinse their mouth properly.

Moisture uptake studies

Due to presence of hydrophilic excipients, orodispersible tablets are prone to attract moisture from the environment. This calls for need of special attention towards their storage and packaging. Therefore, moisture uptake studies are strongly recommended for orodispersible tablets.^[22] The test was performed by keeping ten tablets in a desiccator (containing calcium chloride) for 24 hours at 37°C to assure complete drying. The tablets were then weighed and stored for 2 weeks at 75% humidity. To achieve required humidity, a saturated solution of sodium chloride was kept at the bottom of the desiccator for three days. On the tenth day, tablets were re-weighed and the percentage increase in the weight was recorded.

Drug content

Twenty tablets were weighed and powdered. An amount of the powder equivalent to 100 mg of nimesulide was dissolved in 100 ml of pH 8.4 alkaline borate buffer, filtered, diluted appropriately, and analysed for drug content at 397 nm using UV-Visible spectrophotometer (Systronics 2202, India).^[23]

In vitro dissolution studies

For *in vitro* drug release studies, an eight stage USP dissolution apparatus II (Lab India, DS 8000) was used. The dissolution test was performed using 900 ml of alkaline borate buffer (pH 8.4) at $37 \pm 0.5^\circ\text{C}$. The speed of rotation of paddle was set at 100 rpm. At a predetermined time interval, 5 ml samples were withdrawn, filtered through Whatman filter paper, adequately diluted, and

analyzed using UV-Visible spectrophotometer (Systronics 2202) at 397 nm. All experiments were run in triplicate.

Stability testing

The prepared batches were evaluated for stability studies. During the full duration of study temperature and relative humidity of about $40 \pm 2^\circ\text{C}$ and 75% RH, respectively were maintained. The formulations were analysed at 0 day, 1 and 3 month time interval for hardness, friability, tensile strength, drug content, and *in vitro* disintegration time.

RESULTS AND DISCUSSION

Characterization of *Lallemantia reylenne* seeds

Powder flow properties, swelling index, viscosity, pH, and loss on drying (LOD) were studied for characterizing the powdered *Lallemantia reylenne* seeds. The results of powder flow properties [Table 2] clearly indicate good flow characteristics. Swelling index was found to be 1400, which point towards good swelling capability of *Lallemantia reylenne* seeds. Viscosity of 1% w/v solution at $37 \pm 1^\circ\text{C}$ of seeds of *Lallemantia reylenne*, using spindle number 62 of Brookfield viscometer was found to be 60, 90, 120, 150, 235, and 302 centipoise at 1.5, 3, 6, 12, 30, and 60 rpm, respectively. Plots between shear stress and rate of shear were plotted which clearly indicates obedience to newtonian flow [Figure 1]. Powdered *Lallemantia reylenne* solution (1% w/v) at $37 \pm 1^\circ\text{C}$ exhibited a pH of 6.42. Loss on drying was obtained to be 10.85%. Owing to its good swelling and powder flow properties, *Lallemantia reylenne* seeds were further evaluated as a superdisintegrant in nimesulide orodispersible tablets.

Evaluation of tablets

All the batches of orodispersible tablets were formulated under similar conditions to avoid processing variables. The tablets prepared by direct compression method were found to be free from capping, chipping, and sticking. The prepared tablets were evaluated for various physical parametric tests. The diameter and thickness [Table 3] of tablets was found to be 8.39 ± 0.05 to 8.41 ± 0.04 mm (A1-A4), 8.42 ± 0.04 mm to 8.41 ± 0.03 mm (B1-B4), and 4.71 ± 0.03 mm to 4.78 ± 0.04 mm (A1-A4), 4.81 ± 0.06 mm to 4.80 ± 0.05 mm (B1-B4), respectively. An appreciable effect was seen on tablet hardness, friability and tensile strength due to increasing concentration of *Lallemantia reylenne*. Hardness and friability [Figure 2] were found to be 2.84 ± 0.66 to $4.80 \pm$

Table 2: Powder evaluation parameters

Parameters	Results
Bulk density(g/cm ³)	0.46
Tapped density(g/cm ³)	0.55
Carr's compressibility index (%)	16.36
Angle of repose	26.56
Hausner ratio	1.21
Swelling index	1400
pH	6.42
LOD (%)	10.85

0.35 kg/cm² and 0.59 ± 0.04 to 0.24 ± 0.03%, respectively, clearly indicating binding potential of *Lallemantia reylenne* seeds. Tensile strength (parameter of mechanical integrity of tablets) was found to increase from 0.457 ± 0.08 to 0.760 ± 0.10 MN/m², respectively confirmed binding capability of *Lallemantia reylenne* seeds. All of the batches passed weight variation test.

Wetting time, water absorption ratio, and *in vitro* disintegration time were found to be ranging between 18 ± 2 to 10 ± 3 seconds, 59.11 ± 0.65 to 85.76 ± 0.96, and 20 ± 1 to 12 ± 1 seconds, respectively. Water absorption capacity was found to increase with the increase in concentration of *Lallemantia reylenne* seeds from batches A1 to A4, which could be due to higher water uptake by the natural polymer. Water uptake coupled natural polymer swelling could be the most probable mechanism for concentration dependent reduction in disintegration time by the *Lallemantia reylenne* seeds. Hence, the formation of highly wettable/ porous structure upon contact with water may be the best possible reason for fast disintegration achieved by inclusion of powdered *Lallemantia reylenne* seeds in the orodispersible tablets.

R_{eff,P} is an indicator of tablet porosity. R_{eff,P} and porosity [Figures 3 and 4] were found to be ranging from 3.122 ± 0.45 to 4.126 ± 0.31 mm (A1 to A4) and 15.522 to 24.576%, respectively, indicating appreciable capability of *Lallemantia reylenne* seeds to increase water penetration due to wicking action, which increases porosity thus lowers disintegration time with increase in polymer concentration. So these tests clearly depicted the potential of *Lallemantia reylenne* seeds to increase the porosity of tablets with increase in its concentration. Tablet packing fraction was found to be 0.822, 0.805, 0.786, and 0.754 (A1-A4), which indicates towards tablet superdisintegrant property of *Lallemantia reylenne* seeds. Figure 5 depicts the disintegration pattern of orodispersible tablets formulated using *Lallemantia reylenne* seeds as superdisintegrant. Five healthy male volunteers were selected to judge *in vivo* disintegration time. The *in vivo* disintegration time was found to be 22 ± 2 to 11 ± 2 seconds (A1-A4). *In vivo* performance of the formulated orodispersible tablets using *Lallemantia reylenne* as superdisintegrant was well in line with the *in vitro* results.

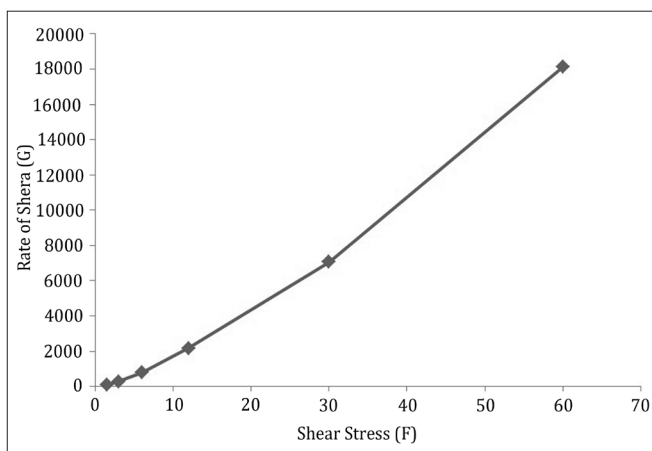


Figure 1: Shear stress versus rate of shear plot

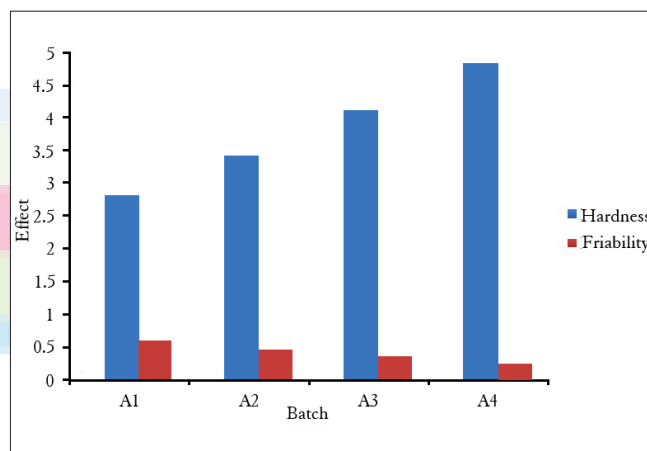


Figure 2: Effect of *Lallemantia reylenne* on tablet hardness and friability

Table 3: Evaluation of the prepared tablets

Parameters	A1	A2	A3	A4	B1	B2	B3	B4
Diameter (mm)	8.39±0.05	8.42±0.03	8.44±0.02	8.41±0.04	8.42±0.04	8.45±0.02	8.42±0.05	8.41±0.03
Thickness (mm)	4.71±0.03	4.75±0.04	4.73±0.02	4.78±0.04	4.81±0.06	4.79±0.07	4.80±0.02	4.80±0.05
Friability (%)	0.59±0.04	0.48±0.05	0.38±0.01	0.24±0.03	0.84±0.06	0.87±0.04	0.70±0.02	0.68±0.01
Hardness (kg/cm ²)	2.84±0.66	3.40±0.27	4.10±0.82	4.80±0.35	2.56±0.72	2.87±0.49	3.01±0.77	3.40±0.56
Tensile strength (MN/m ²)	0.457±0.08	0.541±0.12	0.654±0.05	0.760±0.10	0.402±0.09	0.454±0.07	0.475±0.14	0.537±0.11
Weight variation test	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Wetting time (sec)	18±2	15±1	12±2	10±3	51±2	44±4	38±1	36±3
Water absorption ratio %	59.11±0.65	69.95±0.84	76.45±0.78	85.76±0.96	52.12±0.66	59.10±0.28	63.29±1.45	70.53±1.10
<i>In vitro</i> disintegration time (sec)	20±1	17±2	15±2	12±1	65±5	55±4	40±6	25±5
<i>In vivo</i> disintegration time (sec)	22±2	19±3	14±1	11±2	63±5	52±6	42±3	27±2
Moisture uptake (%)	0.82±0.03	0.75 ±0.05	0.62 ±0.08	0.54 ±0.06	0.77 ±0.02	0.62 ±0.04	0.55 ±0.01	0.47 ±0.01
Drug content (%)	98.24±0.15	98.45±0.20	97.98±0.55	97.12±0.66	95.75±1.03	96.59±0.56	98.22±0.87	97.27±0.92
f ₂	72.54	77.74	88.16	97.21	71.13	87.55	81.49	71.80

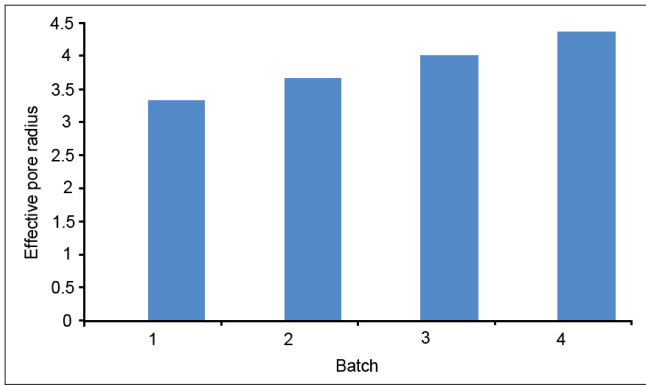


Figure 3: Effect of *Lallelantia reylenne* on effective pore radius

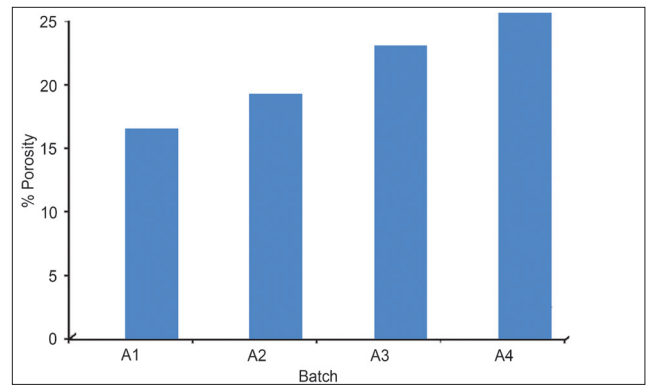


Figure 4: Effect of *Lallelantia reylenne* on tablet porosity

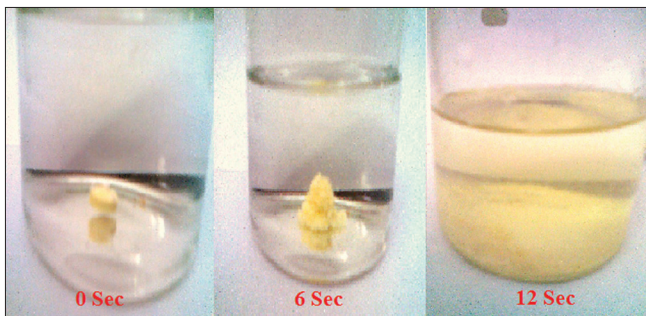


Figure 5: Disintegration pattern of prepared orodispersible tablets containing *Lallelantia reylenne* seeds

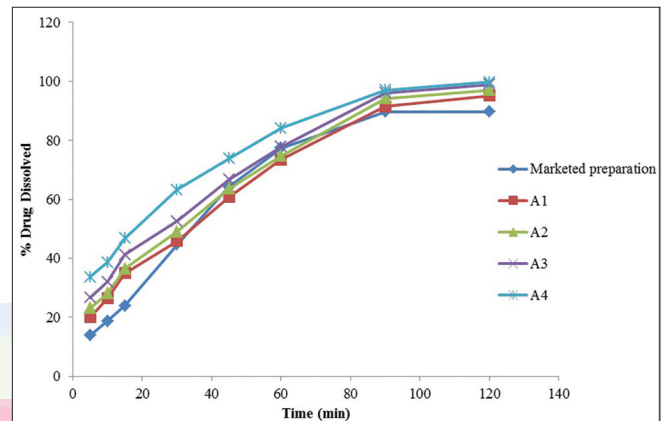


Figure 6: *In vitro* release profile of nimesulide from orodispersible tablets prepared using powdered *Lallelantia reylenne* seeds as superdisintegrant

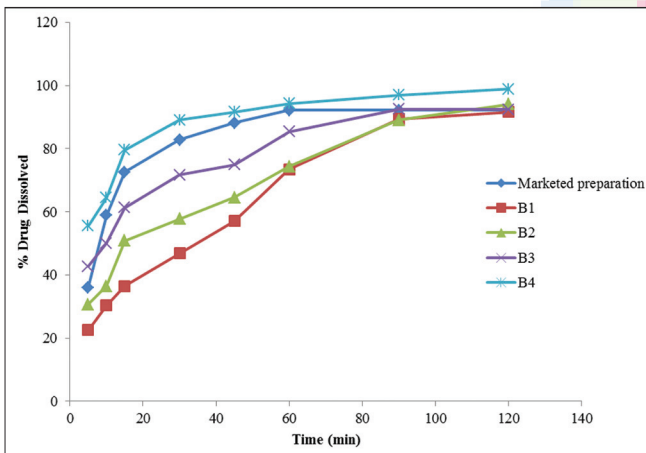


Figure 7: *In vitro* release profile of nimesulide from orodispersible tablets prepared using croscarmellose sodium as superdisintegrant

The moisture uptake study indicated no significant uptake of moisture by the prepared batches during the 10 day trial period. Percent moisture uptake was found to be 0.82 ± 0.03 to 0.54 ± 0.06 (A1-A4) and 0.77 ± 0.02 to 0.47 ± 0.07 (B1-B4).

In vitro nimesulide release was 95.13% (A1), 99.80% (A4), 91.58% (B1), and 94.21 (B4) batches of orodispersible tablets [Figures 6 and 7]. The similarity factor (f_2) is a logarithmic transformation of the sum-squared error of differences between the test T_j and reference R_j products over all time points. It is a useful tool for comparison of dissolution profiles when more than three or four

dissolution time points are available.

$$f_2 = 50 \times \log \left\{ \left[1 + \frac{1}{n} \sum_{j=1}^n w_j \left| \frac{R_j - T_j}{R_j} \right| \right]^2 - 0.5 \right\} \times 100$$

Where, w_j is an optional weight factor. The similarity factor fits result between 0 and 100. It is 100 when the test and reference profiles are identical and tends to 0 as the dissimilarity increases. In order to consider similar dissolution profiles, f_2 values should be close to 100. The results obtained from the calculation of f_2 factor showed that there is a similarity of dissolution profiles between A1 to A4 and B1 to B4 and Nimulid MD tablets. However, A3 and A4 batches showed f_2 values of 88.16 and 97.21, respectively, which were highest amongst all the formulated batches.

Stability studies for the prepared batches containing *Lallelantia reylenne* as superdisintegrant was performed which indicated that there was no significant change in tablet hardness, friability, tensile strength, *in vitro* disintegration time, and drug content [Table 4].

CONCLUSION

In the present study the superdisintegrant property of *Lallelantia*

Table 4: Stability study data of orodispersible tablets

Batch	Parameter (Months)														
	Hardness			Friability			Tensile strength			Drug content			<i>In vitro</i> disintegration time		
	0	1	3	0	1	3	0	1	3	0	1	3	0	1	3
A1	2.84± 0.66	2.79± 0.20	2.52± 0.40	0.59± 0.04	0.61± 0.01	0.63± 0.03	0.457± 0.08	0.449± 0.05	0.432± 0.02	98.24± 0.15	98.10± 0.20	97.74± 0.15	20±1	22±2	24±1
A2	3.40± 0.27	3.32± 0.10	3.27± 0.20	0.48± 0.05	0.51± 0.04	0.55± 0.07	0.541± 0.12	0.535± 0.10	0.530± 0.20	98.45± 0.20	98.42± 0.15	98.36± 0.55	17±2	18±1	20±3
A3	4.10± 0.82	4.05± 0.05	3.95± 0.02	0.38± 0.01	0.41± 0.05	0.43± 0.09	0.654± 0.05	0.648± 0.02	0.636± 0.05	97.98± 0.55	97.72± 0.20	96.65± 0.35	15±2	17±3	19±1
A4	4.80± 0.35	4.74± 0.21	4.69± 0.20	0.24± 0.03	0.27± 0.01	0.29± 0.02	0.760± 0.10	0.751± 0.03	0.743± 0.02	97.12± 0.66	96.85± 0.33	96.52± 0.14	12±1	13±2	15±1

reylenne seeds have been explored. The tablets disintegrated much faster and consistently when *Lallemantia reylenne* was used as superdisintegrant compared with cross carmellose sodium. It could be concluded that *Lallemantia reylenne* seeds could be used as natural superdisintegrant in the formulation of orodispersible tablets.

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