
Formulation and Evaluation of Directly Compressible Dispersible Tablets of *Panchagni Lavana*

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Formulation of ayurvedic powder preparations into tablets may increase dosage uniformity. Application of direct compression method to ayurvedic preparations can be regarded as a major advance. In the present study, dispersible tablets of *panchagni lavana* were prepared by direct compression method. *Panchagni lavana* was subjected to preformulation studies to test the suitability of direct compression method and appropriate formulations were developed. These formulations were further evaluated for hardness, friability, weight variation, uniformity of dispersion, disintegration test and stability studies. Attempts were made to get minimum possible disintegration time by varying the concentrations of sodium starch glycolate and starch. It was found that, use of mixture of both the disintegrating agents was highly useful in the formulation of dispersible tablets of *panchagni lavana*. The study further revealed the usefulness of direct compression method to formulate dispersible tablets of ayurvedic preparations.

A number of ayurvedic preparations are used in the form of powders. Many of these are intended to be dispersed or mixed in liquids prior to administration. In such cases, dosage is poorly regulated. Formulation of these preparations into tablet form would be a better approach to maintain dosage uniformity. Since higher temperature and moisture levels of wet granulation method may be harmful to active principles of plant products¹, direct compression method would be useful for the development of tablets for ayurvedic preparations. Though there are innumerable attempts to develop tablets using direct compression method for allopathic medicines²⁻⁴, application of this technology to ayurvedic preparations would be a major initiative in this direction. *Panchagni lavana*, an ayurvedic preparation, contains various active plant materials that include *ajamoda*, *atimadhura*, *annison*, *salt*, *hing*, *jatamansi*, *jeeraka*, *twak*, *navasagar*, *mareecha*, *usheera*, *shunti* and *shatapushpa* and is indicated for many GIT disturbances like anorexia, indigestion, flatulence,

constipation, dyspepsia and belching. Normal prescribed dose of this preparation is half a teaspoon with water or buttermilk 2-3 times a day⁵⁻¹⁴. In the present work, an attempt has been made to develop dispersible tablets of *panchagni lavana* by direct compression method.

MATERIALS AND METHODS

Panchagni lavana (PL), was obtained from M/s S.N. Pandit and sons, Mysore. Dicalcium phosphate (DCP, directly compressible grade, Emcompress), sodium starch glycolate (SSG), potato starch IP, talc IP and magnesium stearate IP were gift samples from Waksman Selmen Pharmaceuticals, Ananthapur, A.P.

Preparation of tablets:

Six tablet formulations were developed by keeping the proportion of PL and DCP constant and by altering composition of disintegrating agents. Each tablet contained half teaspoonful of PL. The average weight of PL equivalent to one teaspoonful quantity was determined by measuring and weighing PL ten times with three dif-

*For Correspondence

ferent teaspoons, which was divided by 2 to get average weight for half teaspoon quantity of PL. Prior to compression into tablets, tableting properties such as flowability¹⁵, compressibility index¹⁶ and bulk density¹⁶ for PL alone and blends of PL and DCP in different proportions were determined. After a careful study, an optimum proportion was selected for compression. The results of the tableting properties are depicted in Table 1. Finally accurately weighed ingredients were blended and compressed into tablets with a single punch tableting machine using 13 mm biflat punches.

Various evaluation tests for tablets such as hardness¹⁶ (using a Pfizer hardness tester), friability¹⁶, weight variation¹⁷, uniformity of dispersion¹⁷ and disintegration test¹⁸ were studied using standard methods. Stability study with respect to disintegration time for three months was carried out by storing the tablets at room and elevated temperature (45°). At the end of each month, tablets were evaluated for disintegration time. Results are shown in Table 2.

RESULTS AND DISCUSSION

The average weight of PL equal to half a teaspoonful quantity was found to be 1.17±0.03 g, which was incorporated in each tablet. Since, tableting properties of PL alone were very poor, DCP was blended in different proportions. As proportion of DCP was increased, angle of repose and compressibility index were decreased (Table 1). 1:0.1 proportion of PL and DCP was selected for compression

into tablets which had optimum tableting properties and with this proportion, weight of the tablet could also be kept less.

All the prepared formulations passed friability (percentage friability was within 1%), weight variation (percentage deviation was within ± 5%) and uniformity of dispersion test. Tablet hardness ranged from 2.7-3.0 kg/cm².

Initially, disintegration time of formula T-1 was evaluated to know whether 5% starch alone could provide the desired rate. However, these tablets failed the disintegration test. With an intention for reducing the disintegration time, the amount of starch was increased to 10% in the formulation T-2. These tablets, even though passed the disintegration test, took nearly 2 min (106 sec) to disintegrate. In order to further improve the disintegration property, super disintegrating agent, SSG (4%) was used along with 5% starch in T-3. Disintegration time was lowered to 60.33 sec, which was found satisfactory. The aim of the study was to formulate dispersible tablets of PL with minimum possible disintegration time. Hence an attempt was made to reduce the disintegration time further by altering the concentrations of starch and SSG. The results of disintegration test of T-3, T-4 and T-5 have indicated that, the disintegration time was not lowered significantly with the rise in the concentration of any one of the disintegrants used. But the disintegration test of T-6 (disintegration time is 44.33±0.66 sec) revealed that,

TABLE 1: TABLETING PROPERTIES OF PANCHAGNI LAVANA

Proportion of PL and DCP	Angle of Repose	Compressibility Index(%)	Bulk Density
PL alone (1:0)	29.47±0.28	36.36±0.24	0.71±0.01
1:0.1	24.74±0.22	31.82±0.42	0.73±0.01
1:0.2	23.16±0.21	30.58±0.52	0.77±0.00
1:0.3	21.81±0.14	29.32±0.22	0.83±0.01
1:0.4	20.44±0.23	28.74±0.19	0.90±0.01
1:0.5	19.40±0.25	27.62±0.28	0.97±0.00
1:0.1 + 1% Talc + 1% Magnesium stearate	23.98±0.22	28.34±0.11	0.74±0.00

Tableting properties of panchagni lavana (PL) alone and along with other excipients (DCP = dicalcium phosphate, talc and magnesium stearate) were determined in triplicates. Mean values ± standard error mean (SEM) are of a sample of n=3.

TABLE 2: RESULTS OF EVALUATION TESTS FOR TABLETS

Formula	Composition of Disintegrants %		Hardness (kg/cm ²)	Friability (%)	Disintegration Time (sec)	Disintegration time after 3 months (sec)	
	Starch	SSG				Room temp	45°
T-1	5	-	2.7±0.05	0.95±0.06	295.00±1.73	297.66±0.33	305.00±0.53
T-2	10	-	2.98±0.06	0.94±0.60	106.00±1.15	104.66±0.88	115.66±0.88
T-3	5	4	2.83±0.07	0.85±0.04	60.33±0.33	61.66±0.67	68.50±0.41
T-4	10	4	2.96±0.06	0.99±0.06	55.33±0.33	53.66±0.33	64.67±0.88
T-5	5	8	3.00±0.04	0.99±0.01	57.00±0.58	58.00±0.57	68.67±0.33
T-6	10	8	2.95±0.05	0.82±0.04	44.33±0.67	43.33±1.20	54.66±0.88

Prepared tablet formulations (T-1, T-2, T-3, T-4, T-5, T-6) were evaluated for various quality control tests such as hardness, friability, disintegration time and disintegration time after storage for three months following reported methods in triplicates. Mean values±standard error mean (SEM) of n=3 are reported. SSG = Sodium starch glycolate.

an increase in the concentration of both the disintegrants has lowered the disintegration time significantly. This may be due to combined effect of both disintegrants at higher proportion.

After storage for three months, the disintegration time was remained unchanged at room temperature; whereas at elevated temperature (45°), disintegration time was slightly increased. This is in conformity with the report that SSG has the tendency to increase the disintegration time of tablets, when stored at elevated temperature and humidity¹⁹.

In conclusion, the results have indicated that either SSG or starch alone failed to reduce disintegration time satisfactorily. The use of this combination can be considered as highly beneficial in the preparation of dispersible tablets of PL. It is evident from the present study that direct compression method can be successfully applied to formulate dispersible tablets of ayurvedic powder preparations.

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