

FORMULATION OF ORODISPERSIBLE TABLET OF *LUFFA ACUTANGULA* (L) ROXB USING NOVEL CO-PROCESSED VIA SPRAY DRIED EXCIPIENT

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Received: 10 Oct 2014 Revised and Accepted: 12 Nov 2014

ABSTRACT

Objective: The objective of this research was to co-process via spray dry tablet excipients in the formulation of orodispersible tablet (ODT) containing *Luffa acutangula* (L) Roxb fruit aqueous extract (LAE) which were prepared by direct compression method.

Methods: The excipients and LAE were made by co-process via spray dry to create mixtures that can help in achieving direct compression optimum disintegration time along with the required hardness and friability. The excipients compose by maltodextrin succinate (MDS), polyvinylpyrrolidone (PVP) and mannitol (Mnt) in the ratio (1:1:8; 2:1:7; 3:1:6). The pre-compressive parameters for the blends and post-compressive parameters for the prepared tablets were evaluated. The blend was examined for flowability and compressibility sufficient mechanical integrity. The ODT properties were evaluated for weight variation, hardness, friability, in vitro disintegrating time, and in vitro wetting time.

Results: ODT of LAE were prepared using novel co-processed excipients consisting of MDS-PVP-MT (2:1:7) had a shorter disintegration time and showed the best pharmaceutical performance. The formulations showed desired pre and post-compressive characteristics, short term accelerated stability study was performed for optimized formulation and found that LAE ODT were prepared by coprocessed via spray dried no evidence of physical changes.

Conclusion: ODT of LAE are successfully prepared using novel MDS-PVP-Mnt (ratio 2:1:7) as excipient by co-processed via spray dried by direct compression method and ODT of LAE would be alternative to the currently available conventional tablets.

Keywords: Orodispersible tablet (ODT), Co-process spray dried, Direct compression, Maltodextrinsuccinate, Polyvinylpyrrolidone, Mannitol.

INTRODUCTION

United States Pharmacopeia [1] defined ODT as a solid dosage form containing medicinal substance or active ingredient which disintegrates rapidly usually within a matter of seconds when placed upon the tongue. European Pharmacopoeia has used the term orodispersible tablet for tablets that disperses readily and within 3 min in the mouth before swallowing. ODTs overcomes the disadvantages of conventional dosage form especially dysphagia (difficulty in swallowing) in pediatric and geriatric patients [2,3]. Fast dissolving tablets disintegrate or dissolve rapidly in the saliva without the need for water. When is place on the tongue, this tablet disintegrates instantaneously, releasing the drug, which dissolves or disperses in the saliva. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach [4,5]. ODT contain agents to enhance the rate of tablet disintegration in the oral cavity, and are more appropriately termed fast-disintegrating tablets, as they may take up to a minute to completely disintegrate. The number of fillers/binders/disintegrant which can be used for ODT formulations is limited because these bulk excipients have to fulfill special requirements, such as being soluble in water, pleasant taste, mouth feel, sweetness, and rapid dispersibility [6].

Compared with existing excipients, the improved physical, mechanical, and/or chemical properties of such excipients have helped in solving formulation problems such as flowability, compressibility, hygroscopicity, palatability, dissolution, disintegration, sticking, and dust generation [7]. Therefore, to fulfill this requirement co processed excipients via spray drying is an alternative method to improve the compactability of drugs [8]. Co-processing is defined as combining 2 or more established excipients by an appropriate process. Co-processing of excipient could lead to formation of excipients with superior properties compared with the simple physical mixture of their components or with individual components [9]. The co-processing is the most widely explored method for the preparation of direct compressible adjuvant because it is cost effective and can be prepared in-house based on the

functionality required [10]. Co-processing methods are usually used to improve rheological and compression characteristics of pharmaceutical excipients [11].

Direct compression technique can now be applied for preparation of ODT, because of the availability of improved excipients especially super disintegrants and sugar based excipients [12]. Direct compression is a well-known and simple method in tablet manufacturing. Direct compression technique by which tablets are compressed directly from mixtures of active and excipients was used for formulation [10]. It has a number of advantages, the greatest of which are the saving of time, labour and cost. It involves only a few processing steps from beginning to end. However, direct compression also has certain disadvantages: the physical limitations of the drug and the physical properties of the raw materials present become more critical and must be controlled more precisely. Direct compression of powders requires materials exhibiting flowability and compressibility. Those parameters become more critical when the formulation contains large amounts of active substances with poor compression properties [13].

Extracts from medicinal plants are often used as active components in solid dosage forms, however, these products generally present deficient rheological properties, inadequate compressibility and high sensitivity to atmospheric moisture, resulting in difficult direct compression [14]. Additionally, tablets containing a high amount of extract show prolonged disintegrate times, therefore, the release of the active constituents is affected. Extract is so intensely bitter that they required extensive processing to convert them in to palatable dosage forms. The development and production of tablets containing a high dose of active ingredients is a complex and extensive technological challenge [13]. Previous studies reported that the *Luffa acutangula* (L) Roxb fruit has antidiabetic activity and antihyperlipidemic [15,16], diuretics [17], antihypertension [18]. In addition, the Cucurbitaceae family with several active substances such as cucurbitacin, cucurbitane, dehydrodiconiferyl reported has activity as an anti-obesity and antiadipogenic [19-21].

The purpose of this work was to investigate the feasibility to produce ODT by co-processed via spray dried excipients and extracts to improve rheological properties, compaction behavior, improve palatability and moisture stability, so that can be made by direct compression method.

MATERIALS AND METHODS

Materials

Luffa acutangula (L) Roxb extract (LAE)

The plant materials were obtained from the Research Institute for Medicinal and Aromatic Plants, Bogor, Indonesia. All part of *Luffa acutangula* (L) Roxb fruit after were chopped small were extracted by maceration using 80% ethanol. Non polar part of extract was removed and the remaining extract was evaporated in the vacuum evaporator at a temperature 60°C to obtain a thick extract.

Excipients

The excipients used were Maltodextrin DE 10-15 (Zhucheng Dongxiao Biotechnology, China), Succinate anhydrate, Polyvinyl pyrrolidone K-30 (Delta Chemical, USA), Mannitol (Qingdao Bright Moon seaweed Group, China), magnesium stearate, organic solvent, all other materials used were of pharmaceutical grade.

Preparation of powder blends for compression

Powder blend of LAE orodispersible tablets (LAE ODT) was prepared according to the formula given in the Table 2. The powder blends were made with 3-ways, the first was the excipients and extract were co-processed via spray dried (formulas F1, F2, F3). The second was excipients only performed by co-process via spray dry and extract was added physically (formulas F4, F5, F6).

The third was excipients and extract were mixed physically (formulas F7, F8, F9). The feed suspensions were spray dried according to the process conditions shown in table 1, spray drying of these suspensions was performed in a Buchi Mini Spray Dryer B-290. Excipients were prepared from aqueous suspensions of MDS, PVP, Mannitol in the different ratio (1:1:8; 2:1:7; 3:1:6) were prepared to optimize the excipient ratio.

The spray dried powders were cooled down to room temperature and stored (room temperature, ambient relative humidity) prior to their characterization and further use. Before preparation of tablets, the powder blends of all formulas were subjected to pre-compression parameter like bulk density, tapped density, angle of repose, percentage compressibility and Hausner ratio [22].

Table 1: Process conditions during spray drying in Buchi Mini Spray Dryer B-290

Process parameters	Setting
Feed rate (kg/h)	medium
Inlet drying air temperature (°C)	170
Outlet drying air temperature (°C)	70
Drying gas rate (kg/h)	40
Nozzle cleaner	2
Aspirator (%)	70
Pump (%)	10

Table 2: Formulations of LAE ODT prepared by direct compression method

Formulation code	F1	F2	F3	F4	F5	F6	F7	F8	F9
LA Extract	200	200	200	200	200	200	200	200	200
MDS-PVP-Mnt (1:1:8) CPSD EL	200	-	-	-	-	-	-	-	-
MDS-PVP-Mnt (2:1:7) CPSD EL	-	200	-	-	-	-	-	-	-
MDS-PVP-Mnt (3:1:6) CPSD EL	-	-	200	-	-	-	-	-	-
MDS-PVP-Mnt (1:1:8) CPSD E	-	-	-	196	-	-	-	-	-
MDS-PVP-Mnt (2:1:7) CPSD E	-	-	-	-	196	-	-	-	-
MDS-PVP-Mnt (3:1:6) CPSD E	-	-	-	-	-	196	-	-	-
MDS-PVP-Mnt (1:1:8) PM	-	-	-	-	-	-	192	-	-
MDS-PVP-Mnt (2:1:7) PM	-	-	-	-	-	-	-	192	-
MDS-PVP-Mnt (3:1:6) PM	-	-	-	-	-	-	-	-	192
TacK (1%)	-	-	-	-	-	-	4	4	4
Magnesium stearate 1%)	-	-	-	4	4	4	4	4	4
Total weight (mg)	400	400	400	400	400	400	400	400	400

MDS-PVP-Mnt: Maltodextrin succinate - Polyvinylpyrrolidone - Mannitol as excipient, CPSD EL: Co-Processed Spray Dried Excipient and *Luffa acutangula* extract (LAE), CPSD E: Co-Processed Spray Dried Excipient + LAE physically, PM: Physical Mixture of MDS-PVP-Mnt + LAE

Preparation of ODT

LAE ODT was prepared by direct compression method according to the formula given in the Table 2. Powder blend was weighed and mixed in geometrical order and the tablets were compressed using 11 mm die and flat faced punch to get tablets of 400 mg weight using a single punch tablet compression machine (Erweka tablet machine, Germany). In the same way, powder blend of all formula was compressed at 1000 kg/cm².

Evaluation for pre-compressive parameters

Morphology: The observation of the shape and morphology of blend powder resulting from co-process via spray dry and physical mixture by means of Scanning Electron Microscope (SEM)

Powder Flowability

Powder flowability was determined by assessed angle of repose, flow time, bulk density, tapped density [23, 24].

Powder Compressibility

Powder compressibility was determined by assessed Carrs index and Hausner index [25].

Evaluation for post-compressive

Physical-chemical characterization of tablets: Tablet formulations were subjected to the following tests according to The United States Pharmacopeia [1].

General appearance: The general appearance of tablets, its visual identity, and overall elegance is essential for consumer acceptance. The control of general appearance of tablets involves measurement of number of attributes such as tablet size, color and surface texture and hence the parameters were evaluated.

Uniformity, Hardness and Friability

The test was carried out according to the US Pharmacopeia [1].

In-vitro wetting time

For measurement of wetting time five circular tissue papers of 10cm diameters are placed in a petridish with a 10 cm diameter. Ten millimeters of water is added to petridish. A tablet is carefully placed on the surface of the tissue paper. The time required for water to reach the upper surface of the tablet is noted as a wetting time [26].

In vitro disintegration time

Tablet was added to 10 ml of phosphate buffer solution pH 6.8 which correlates pH of saliva at $37 \pm 0.5^\circ\text{C}$ and time required for complete dispersion of the tablet was noted [24].

Stability studies of ODT

Short term accelerated stability study was performed for the prepared ODT formulation to investigate stability of the formulation in terms of physical changes. The stability study involved storing the prepared formulation for a period of 3 months at $40^\circ\text{C} \pm 2^\circ\text{C}$ and $75\% \pm 5\%$ RH. The tablets were evaluated periodically at 0, 15, 30, 45, 60, 75 and 90 days for any physical changes [27].

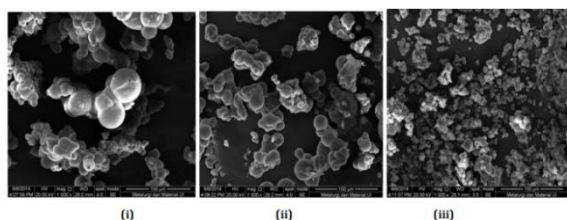
RESULTS AND DISCUSSION

Evaluation for pre-compressive parameters

Morphology

Powder blends all formula have a light brown color, aromatic and water soluble. Powder blend from co-process via spray dry produces a semi-sweet, smooth, cool taste but powder blend from physical mixture has a little bit bitter. Manufacture ODTs by sugar-based excipients (e. g. mannitol) which display high aqueous solubility and sweetness and hence, impart taste masking and a pleasing mouth feel. Sugar alcohol (mannitol) as a best sugar for chewable tablet formulation was prepared by direct compression [10, 28].

The result of observation of shape and morphology of powder blend by means of Scanning Electron Microscope (SEM) as showed in fig. 1. The powder blend results co-processed via spray dried had a spherical shape and refine of surface texture. From fig. 1 with magnification of 1000 times is seen that through the co-processed and spray dry excipient (fig. 1, i and ii) has a larger particle size and spherical shape, spherical shape of the particles and the size of the larger particles produce a powder blend that has a better flow rate [29]. Powder blend particles (fig. 1, iii) have the form of a physical mixture are irregular shape (non spherical shape) according to the form of its original components, in addition to the particle size is smaller than the particle co-process the results. Particles size of powder blend as showed in fig. 2, particles size from co-process via spray dry have most in the range of 181-250 μm so that the particles can be called with microspheres. When compared to physical mixture, powder the results of co-process via spray drying is to have larger grains, this is due to the incorporation of molecules MDS, PVP and Mnt into one larger molecules. Enlargement of particle-size is widely used to improve physical properties like wettability, flowability, bulk density and product appearance [9].



Magnification of 1000 times

- (a) MDS: PVP: Mnt + LAE co- processed spray dried
 (b) MDS: PVP: Mnt co- processed spray dried + LAE physically
 (c) MDS: PVP: Mnt + LAE physically

Fig. 1: SEM micrographs of powder blend

Controlled optimal particle size and particle-size distribution ensures superior flow properties of co-processed excipients without

the need to add glidants [8]. MDS-PVP-Mnt excipient and extract was prepared by co-process via spray drying can improve flow properties by controlling optimal particle size and particle size distribution ensures superior flow properties without the need to add glidants [30].

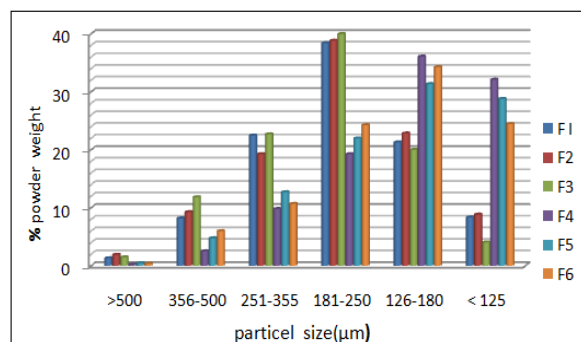


Fig. 2: Particle size distribution

The data obtained from pre-compression parameters such as bulk density, tapped density, Hausner's ratio, Carr's index and angle of repose is given in Table 3. The co-processed powder blend was evaluated for their flow and compression properties in comparison with physical mixture of powder blend.

The co-processed via spray dried powder blend have loose bulk density in range 0.662 to 0.074g/mL, according Yamamoto research, there is the relation between powder characteristics and disintegration time of tablets in the mouth revealed that a high bulk density results in a short disintegration time. Tablets producing disintegration time less than 60s were obtained when the powder bulk density was greater than 0.5 g/mL but tablets with a short disintegration time value tended to possess low hardness [34].

The angle of repose of co-processed powder blend was found to be in the range of 32.09 to 35.26, which indicate good flow property in comparison to physical mixture of powder blend in range 42.83 to 44.65 which indicate passable flow property. This powder blend has good flowability because the material consists of spherical particles with smooth surfaces, no need a glidant to be incorporated within a formulation because of the build up of friction upon compression.

Carr's index of co-processed powder blend (excipient and LAE) in the range of 24.08 to 25.03 % and Hausner's ratio in the range 1.32 to 1.33 which indicate passable flow character in comparison to physical mixture of powder blend have Carr's index in range 40.0 to 40.96 and Hausner's ratio in the range 1.67 to 1.69 which indicate very poor flow character, judging from the value of Hausner Ratio and Carr's Index value of the excipient co-process via spray drying is categorized compressibility passable flow character.

ODTs of LAE were prepared from single excipient co-processed via spray dried from 3 component excipient are MDS, PVP and Mnt. New combinations of existing excipients are an interesting option for improving excipients functionality Co-processing of MDS-PVP-Mnt is based on the novel concept of three excipients interacting at the sub particle level, the objective of which is to provide a synergy of functionality improvement as well as masking the undesirable properties of individual [30].

Co-processing of vegetal extracts with pharmaceutical excipients could lead to the formation of materials with superior mechanical characteristics suitable for direct compression [35]. An alternate method to improve the compactability of drugs could be the co-processing of drug substance and excipients via spray drying. This technique has previously been used to develop excipients mixtures having superior properties (flowability, hygroscopicity, and compactability) compared to the individual excipients or their physical mixtures [36,37]. Prepare LAE ODT using MDS-PVP-Mnt co-processed via spray drying product can serve as a filler, a binder and a disintegrant, so no need of additional other component like glidant.

Sticky products like LAE are difficult to spray dried under normal conditions and exhibit sticky behavior, in order to achieve a

successful drying, high molecular weight drying agent materials such as MDS: PVP: Mnt has been used in spray drying of sticky products.

Table 3: Showing pre-compressive parameters of the excipients

Formulation code	Angle of repose (°)	Loose Bulk Density (g/mL)	Tapped Bulk Density (g/mL)	Hausner,s Ratio	Carr's Index (%)	Flow time (g/sec)
F1	32.09 ± 0.06	0.704 ± 0.008	0.939 ± 0.014	1.33 ± 0.02	25.03 ± 0.03	4.90 ± 0.5
F2	35.26 ± 0.24	0.662 ± 0.011	0.872 ± 0.021	1.32 ± 0.04	24.08 ± 0.08	4.60 ± 0.4
F3	34.14 ± 0.15	0.681 ± 0.009	0.897 ± 0.013	1.32 ± 0.02	24.08 ± 0.08	4.50 ± 0.3
F4	36.54 ± 0.11	0.469 ± 0.012	0.722 ± 0.017	1.54 ± 0.05	35.04 ± 0.12	3.70 ± 0.5
F5	40.92 ± 0.13	0.371 ± 0.014	0.598 ± 0.011	1.61 ± 0.06	37.96 ± 0.08	4.41 ± 0.6
F6	38.80 ± 0.08	0.345 ± 0.015	0.565 ± 0.014	1.64 ± 0.03	38.94 ± 0.11	3.38 ± 0.8
F7	42.83 ± 0.12	0.369 ± 0.017	0.625 ± 0.019	1.69 ± 0.05	40.96 ± 0.13	2.01 ± 0.5
F8	44.23 ± 0.32	0.351 ± 0.009	0.585 ± 0.013	1.67 ± 0.08	40.00 ± 0.09	1.77 ± 0.8
F9	44.65 ± 0.24	0.357 ± 0.011	0.595 ± 0.008	1.67 ± 0.14	40.00 ± 0.15	1.69 ± 0.4

Each value is an average of three determinations ± SD (n=3)

Powder blend (co-process via spray dry excipient and LA extract)

F1: MDS: PVP: Mnt (1:1:8) + LA extract

F2: MDS: PVP: Mnt (2:1:7) + LA extract

F3: MDS: PVP: Mnt (3:1:6) + LA extract

Powder blend (co-process via spray dry excipient and LA extract added physically)

F4: MDS: PVP: Mnt (1:1:8) + LA extract

F5: MDS: PVP: Mnt (2:1:7) + LA extract

F6: MDS: PVP: Mnt (3:1:6) + LA extract

Powder blend (physically mixture of excipient and LA extract)

F7: MDS: PVP: Mnt (1:1:8) + LA extract

F8: MDS: PVP: Mnt (2:1:7) + LA extract

F9: MDS: PVP: Mnt (3:1:6) + LA extract

Evaluation for post-compressive

The orodispersible tablet formulas were evaluated for different parameters like, weight variation, hardness, friability, wetting time [38]. The data obtained of post-compression parameters of prepared ODTs such as weight variation, hardness, friability, in-vitro wetting time and in-vitro disintegration time are shown in Table 4.

All the tablets were prepared under similar experimental conditions, exhibited light brown color, *Luffa* extract characteristic odor, flat shaped with almost smooth surfaces. ODT (F1-F3) is made from co-process via spray drying powder blend have better mouth feel, and improved overall palatability. Spray drying technique is widely used for taste masking of the bitter drugs [13]. Mannitol is commonly used as an excipient in the manufacture of chewable tablet formulations because of its negative heat of solution, sweetness, and 'mouth feel' [31].

The weight of the F1 – F3 tablet meets the requirements of weight uniformity of Indonesia Pharmacopoeia IV [39]. All of F1, F2 and F3 tablets passed weight variation test as the percentage weight

variation was within the pharmacopoeia limits. The weight of all F1, F2 and F3 tablets was considered to be uniform with low standard deviation values, while the F4, F5, F6 and F7, F8, F9 tablet have uniform with high standard deviation values. In general, materials for direct compression tend to show high fill-weight variations as a result of poor flow properties, but co-processed excipients when compared with physical mixtures or parent materials, have been shown to have fewer fill-weight variation problems. The primary reason for this phenomenon is the impregnation of one particle into the matrix of another, which reduces the rough particle surfaces and creates a near-optimal size distribution, causing better flow properties [9]. Although in manufacture ODT from co-processed via spray dried powder blend adds some cost, the overall product cost decreases because of improved functionality and fewer test requirements compared with individual excipients [37].

In all of the formulations, the hardness was found to be in the range of 2.58 to 2.91 kg/cm² indicating good mechanical strength with an ability to with stand physical and mechanical stress conditions while handling.

Table 4: Showing post-compressive parameters of prepared ODTs

Formula code	Weight variation (mg)	Hardness (kg/cm ²)	Friability (%)	Wetting Time (sec)	Disintegration time (sec)
F1	400.24 ± 1.42	2.63 ± 0.33	0.90 ± 0.02	6.33 ± 0.58	58.33 ± 7.77
F2	400.18 ± 1.29	2.58 ± 0.20	0.91 ± 0.04	5.33 ± 0.58	53.00 ± 3.46
F3	399.68 ± 1.81	2.65 ± 0.30	0.87 ± 0.03	6.00 ± 1.73	63.33 ± 7.51
F4	400.19 ± 3.43	2.67 ± 0.24	0.79 ± 0.03	6.33 ± 0.58	64.00 ± 4.36
F5	399.98 ± 4.64	2.69 ± 0.24	0.81 ± 0.04	6.67 ± 1.15	73.33 ± 9.07
F6	400.28 ± 4.37	2.78 ± 0.22	0.80 ± 0.04	8.67 ± 1.53	83.33 ± 6.51
F7	399.91 ± 6.08	2.84 ± 0.18	0.72 ± 0.03	7.67 ± 0.58	91.00 ± 4.58
F8	400.38 ± 5.94	2.83 ± 0.21	0.69 ± 0.04	8.67 ± 0.58	83.67 ± 4.16
F9	400.54 ± 4.76	2.91 ± 0.17	0.72 ± 0.01	8.33 ± 0.58	86.67 ± 3.06

Each value is an average of three determinations ± SD (n=3)

In this work, friability of all formulations was within acceptable limits (less than 1%), the percent friability of formulations (F1, F2, F3) was found to be 0.87 to 0.91 (less than 1.0%) and thus hardness of all formulations were within acceptable limits, indicating good mechanical characteristics. F7, F8 and F9 less friability compared to other formula when all the tablets were compressed at the same pressure. Friability is less than 1%, indicated that tablets had a good mechanical resistance [23].

Wetting dispersion times of the tablets from co-process via spray drying powder blend (F1, F2, and F3) was found shorter (5.33 to 6.33s). Formulation F7, F8 and F9 prepared by physical mixing showed decrease in wetting and dispersion times compared to other formula. Wetting time is the indicator for the ease of disintegration of the tablet in buccal cavity [2]. The formulation containing a combination of MDS-PVP-Mnt (2: 1: 7) by co-process via spray drying took less time while tablets containing MDS-PVP-Mnt (2: 1: 7) by physically mixture took more time for wetting. The wetting time is an important criterion for understanding the capacity of disintegrants to swelling in the presence of little amount of water.

Disintegration time of formula F1 and F2 was found less than 1 minute of (58.33 ± 7.77 and 53.00 ± 3.46 seconds respectively) as showed in fig. 3. The results of in-vitro wetting time and in-vitro disintegration time of F1 and F2 tablets were found to be within the prescribe limits and satisfy the criteria of orodispersible tablets. Among all the batches, F2 had shown best wetting time and disintegration time compared to other batches when all the tablets were compressed at the same pressure. The disintegration time is very important and it is desired to be less than 1 minute [1]. The quick disintegration may assist quick swallowing and drug absorption in the buccal cavity, thus greater bioavailability of the drug [40]. The suspension of powder blends was co-processed via spray-dried to yield a porous powder which was compressed into tablets, tablets manufactured by this method disintegrated in less than 20 seconds in aqueous medium [12].

MDS-PVP-Mnt is a co-processed product consisting of three functions: as filler, a binder and a disintegrant. The ratio of its constituents is MDS: PVP: Mnt 2:1:7 has good flowability because the material consists of spherical particles with smooth surfaces. Good tablets can be prepared at low compression forces. MDS-PVP-Mnt is a physical mixture showed need a glidant to be incorporated within a formulation because of the build up of friction upon compression. Of the two glidants used 1% talcum and 1% magnesium stearat, showed the better improvement in flowability.

Direct compression technique can be applied for preparation of herbal medicine ODT, because of the availability of improved excipients especially sugar based excipients. Another approach to manufacturing ODTs by direct compression is the use of sugar-based excipients (mannitol) which display high aqueous solubility, the sweetness and hence, imparts taste masking and a pleasing mouth feel [41]. Mannitol is commonly used in pharmaceutical formulations and for food products, it occurs as a white, odorless, crystalline powder or as free-flowing granules. It has a sweet taste and a cooling sensation in the mouth (negative heat of solution), making it useful excipient for ODT [42]. Because mannitol is non-hygroscopic, is possible to use it with hygroscopic drugs like LAE. In addition, the metabolism of mannitol does not lead to increases in blood sugar levels, making it viable filler for the formulation of diabetic medications or syndrome metabolic [41].

Co-processed powder blend have been used mainly in direct compression tableting because in this process there is a net increase in the flow properties and compressibility profiles [43]. Spray drying followed by direct compression gives the superior physicochemical properties such as flowability, hygroscopicity, compactability. Combinations of these methods also improve the disintegration behavior of tablets [44].

At short term accelerated stability study of F1, F2 and F3 was performed for the optimized formulation and the results of short term stability studies indicated that there were not any major changes in the physical properties such as color, odor, texture and disintegration time.

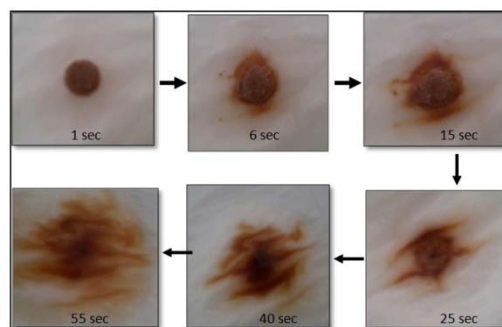


Fig. 3: Images showing disintegrating time of ODT of LAE

CONCLUSION

In conclusion, orodispersible tablets (ODT) of LAE are successfully prepared using novel MDS-PVP-Mnt (ratio 2:1:7) as excipient by co-processed via spray dried and by direct compression method. Orodispersible tablets of LAE would be alternative to the currently available conventional tablets.

CONFLICT OF INTERESTS

Declared None

ACKNOWLEDGMENT

The authors are thankful to National Agency Drug and Food Control of Republic Indonesia and Faculty Pharmacy of Indonesia University for supporting

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