38th Meeting of National Working Group on Indonesian Medicinal Plant

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Proceedings

International Conference On Medicinal Plants

The Future of Medicinal Plants:
From Plant to Medicine

Surabaya, 21-22 July 2010

Organized by

POKJANAS

DAAD
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Universitas Katolik Widya Mandala Surabaya

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PROCEEDING OF INTERNATIONAL CONFERENCE ON MEDICINAL PLANTS

in occasion of

the 38th Meeting of National Working Group on Indonesian Medicinal Plant

21-21 July 2010
Surabaya, Indonesia

Editor :

Elisabeth C. Widjajakusuma

Organizing Committee

FACULTY OF PHARMACY
WIDYA MANDALA CATHOLIC UNIVERSITY

in collaboration with
National Working Group on Indonesian Medicinal Plants
and German Academic Exchange Service

PREFACE

The International Conference on Medicinal Plants in occasion of the 38th Meeting of National Working Group on Medicinal Plant was held on the campus of Widya Mandala Catholic University in Surabaya during 21-22 July 2010. Over 300 participants had many fruitful discussions and exchanges that contributed to the success of conference. The present volume Proceedings (Volume 2) includes the papers presented at the conference and continues where Volume 1 leaves off.

The 192 abstracts that were presented on two days formed the heart of the conference and provided ample opportunity for discussion. Of the total number of presented abstracts, 63 of these are included in the Volume 1 and 58 in this proceedings volume. Both of the Conference Proceedings cover all aspects on key issues related to medicinal uses of plants, their active ingredients and pharmacological effects, production and cultivation of medicinal plants.

We appreciate the contribution of the participants and on behalf of all the conference participants we would like to express our sincere thanks to plenary speakers, Dr. Mona Tawab, Prof. Henk van Wilgenburg, Prof. Tohru Mitsunaga, Prof. De-An Guo, dr. Arijanto Jonosewojo, SpPD FINASIM, Dr. Bambang Prayogo, Mr. Jimmy Sidharta, Ir. Dwi Mayasari Tjahjono, S.Pd, Dipl. Cidesco,Dipl. Cibtac , and everybody who helped to make conference success and especially to our sponsors

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May you all be richly rewarded by the LORD.

All in all, the Conference was very successful. The plenary lectures and the progress and special reports bridged the gap between the different fields of the development of medicinal plants, making it possible for non-experts in a given area to gain insight into new areas. Also, included among the speakers were several young scientists, namely, students, who brought new perspectives to their fields. I hope this proceedings will promote the interdisciplinary exchange of knowledge and ideas in medicinal plant and related industries.

Dr.phil.nat. Elisabeth Catherina Widjajakusuma
Conference Chairman

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CONTENT

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OPTIMIZATION FORMULA OF *ALOE VERA* L. POWDER EXTRACT EFFERVESCENT GRANULES

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Abstract : *Aloe vera* L. is one of medicinal plants spread throughout Indonesia. Based on researches and experiences empirically, Aloe vera L. has been proven to cure or prevent some diseases. The aims of this research were to make effervescent granules of Aloe vera L. powder extract and looking for optimum formula of effervescent granules of Aloe vera L. powder extract which have granules and dissolving time physical properties which are appropriate with rule and regulations. Optimization techniques used this research was factorial design method with two factors and two levels which are concentration of PVP K-30 with low level 2% and high level 5%, and concentration of lactose monohydrate with low level 5% and high level 10%. The observed responses to determine the optimum granules formula in factorial design are angle of repose, granules friability, and dissolving time. The result showed that PVP K-30, lactose monohydrate, and interaction between PVP K-30 and lactose monohydrate significantly influenced the angle of repose, granules friability, and dissolving time. Based on the Design-Expert optimization program, effervescent granules formula with optimum physical properties of granules to reach for 4.58% of PVP K-30 and 9.08% of lactose monohydrate and the result is angle of repose 36.42°, granules friability 0.93%, and granules dissolving time 1.76 minutes.

Keywords: *Aloe vera* L., PVP K-30, lactose monohydrate, effervescent granules, factorial design

INTRODUCTION

Aloe vera L. is a native plant from Afrika especially Mediterania that belong to family Liliaceae which has about 200 species. Based on researches and experiences empirically, *Aloe vera* L. has been proven to cure or prevent some diseases. In this research *Aloe vera* L. will be formulated as effervescent granules because it has a lot of profit such as good taste, ease of use, and convenient. In efforts looking for optimum formula was used factorial design. Because this method can be used find out factors that influences and the interaction and may be found optimum formula. In addition to that was more efficient than *trial and error* which need creativity of formulator, long of duration, need large cost, and often may be failed.

This study used factorial design 2^2 and purposed to learn concentration variation and interaction both of component parts of granules are PVP K-30 and lactose monohydrate to physical properties of granules (index of compressibility, angle of repose, granules friability) and dissolving time.

METHODOLOGY

Materials

Aloe vera L. powder extract (Natura Laboratoria Prima, East of Java, Indonesia), citric acid, sodium bicarbonate, sodium lauryl sulphate (SLS), lactose, PVP K-30, and aspartame.

Method

Optimization techniques used in this research was factorial design method with two factors and two levels which are concentration of PVP K-30 with low level 2% and high level 5%, and concentration of lactose monohydrate with low level 5% and high level 10%. Method was used is wet granulation, which the process has been done by separate

granulation (acid component and base component were granulated separatedly) then the granules have physical properties, such as moisture content, flowability, angle of repose, *Carr's Index*, granules density, granules friability, and dissolving time. Responses observed by factorial design were angle of repose, granule friability, and dissolving time.

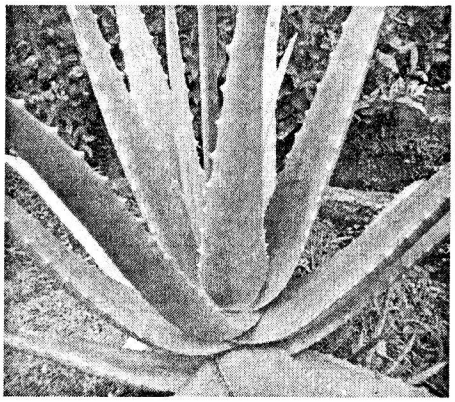

Figure 1. ***Aloe vera*** **L.**

Table 1. Formula of *Aloe vera* L. powder extract effervescent granules

Ingredient	Amount (gram) per sachet			
	F I	F II	F III	IV
Aloe vera L. powder extract	1.75	1.75	1.75	1.75
Citric acid	1.47	1.47	1.47	1.47
Sodium bicarbonate	2.10	2.10	2.10	2.10
PVP K-30	0.14	0.35	0.14	0.35
Lactose monohydrate	0.35	0.35	0.70	0.70
Aspartame	0.105	0.105	0.105	0.105
Sodium lauryl sulphate	0.07	0.07	0.07	0.07

RESULT AND DISCUSSION

A. Thin Layer Chromatography of Aloin

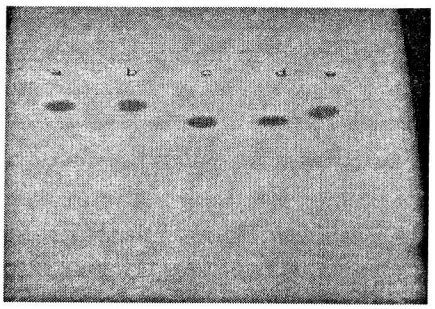

Figure 2. Thin Layer Chromatography of Aloin, purple-colored (λ = 254 nm, mobile phase = Ethyl Acetate : methanol :water = 95 : 4 :1); Rf value = 0,41-0,43 (Norman, 1989)

B. Result of physical properties of granules

The result of physical properties of granules is presented in Table 2.

Table 2. Granules characteristics

Parameter	F I	F II	F III	F IV
Moisture content (percent)	2.52 ± 0.49	3.10 ± 0.21	2.37 ± 0.21	3.19 ± 0.03
Angle of repose (degree)	38.05 ± 0.94	35.95 ± 0.67	36.42 ± 0.06	36.47 ± 0.03
Carr's Index (percent)	11.33 ± 2.31	9.33 ± 1.15	8.67 ± 1.15	7.67 ± 1.53
True density (g/cm^3)	0.54 ± 0.04	0.52 ± 0.01	0.61 ± 0.01	0.53 ± 0.01
Tapped density (g/cm^3)	0.61 ± 0.03	0.57 ± 0.002	0.67 ± 0.01	0.58 ± 0.003
Friability (percent)	1.53 ± 0.35	2.30 ± 0.87	2.73 ± 0.31	0.30 ± 0.1
Dissolving time (minute)	1.59 ± 0.07	1.78 ± 0.11	1.58 ± 0.06	1.79 ± 0.09

C. *Contour plot* of the observed responses

1. Angle of repose

$$Y = 36.72 - 0.52\ X_A - 0.28\ X_B + 0.54\ X_AX_B$$

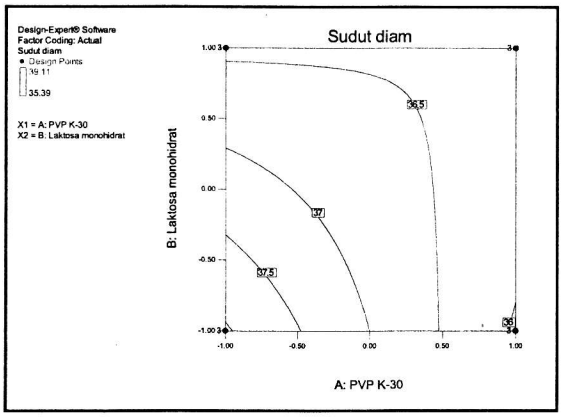

Figure 3. *Contour plot* of angle of repose from *Aloe vera* L. powder extract effervescent granules

Based on analysis of ANAVA, showed that PVP K-30, lactose monohydrate, and the interaction of both influences significantly to angle of repose*Aloe vera* L. powder extract effervescent granules. PVP K-30 and lactose monohydrate gives negative response means decrease angle of repose, but interaction of both gives positive response means will increase angle of repose.

2. Granules friability

$$Y = 1.72 - 0.42\ X_A - 0.20\ X_B - 0.80\ X_AX_B$$

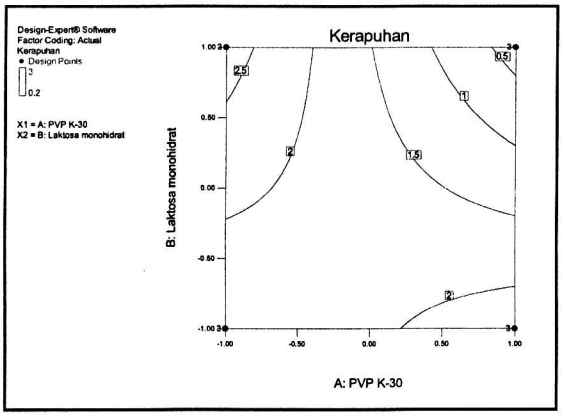

Figure 4. *Contour plot* of friability from *Aloe vera* L. powder extract effervescent granules

Based on analysis of ANAVA, showed that PVP K-30, lactose monohydrate, and the interaction of both influences significantly to friability *Aloe* vera L. powder extract effervescent granules. PVP K-30, lactose monohydrate, and interaction of both gives negative response which will decrease granules friability *Aloe vera* L. powder extract.

3. Dissolving time

$$Y = 101.25 + 5.92\ X_A - 0.083\ X_B + 0.25\ X_AX_B$$

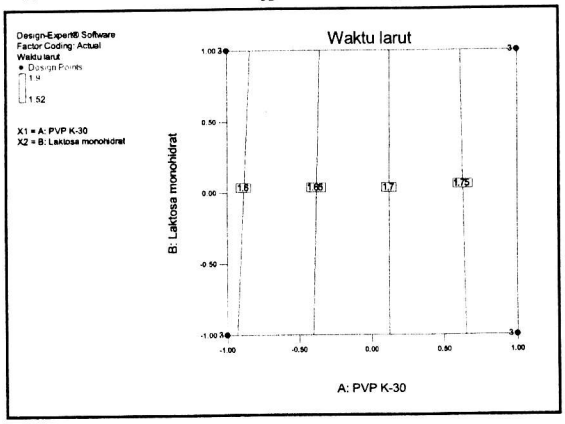

Figure 5. *Contour plot* of dissolving time from *Aloe vera* L. powder extract effervescent granules

Based on analysis of ANAVA, showed that PVP K-30, lactose monohydrate, and the interaction of both influences significantly to dissolving time *Aloe vera* L. powder extract effervescent granules. PVP K-30 more dominant in influences dissolving time *Aloe vera* L. powder extract effervescent granules than interaction between PVP K-30 and lactose monohydrate means will increase dissolving time *Aloe vera* L. powder extract effervescent granules, while lactose monohydrate gives negative response that is decrease dissolving time of granules because lactose monohydrate soluble in water.

Contour plot from each response later overlapping (*superimposed*) until may be found optimum area.

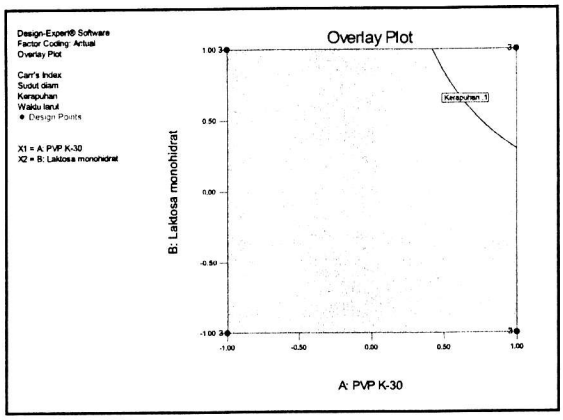

Figure 6. *Superimposed Contour plot* from *Aloe* vera L. powder extract effervescent granules

Yellow-colored area described as prediction optimum area from formula *Aloe vera* L. powder extract effervescent granules with desired responses.

CONCLUSION

- PVP K-30 as a binder, lactose monohydrate as a diluent and the interaction of both

influences significantly to angle of repose, friability, and dissolving time of granules. PVP K-30 can decrease angle of repose and friability of granules but it will increase the dissolving time of granules. Lactose monohydrate will decrease angle of repose, friability, and dissolving time of granules. Interaction between PVP K-30 and lactose monohydrate will increase the angle of repose and dissolving time of granules, but it will decrease friability of granules.

- Optimum formula effervescent granules is the combination of PVP K -30 4.58% and lactose monohydrate 9.08%. Quality the effervescent granules shown that it fullfiled the requirements as a good pharmaceutical preparation with the angle of repose was 36.42%, granules friability was 0.93%, and dissolving time was 1.76 minute.

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