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FORMULATION OF COLA (*COLA NITIDA* A.CHEV) EFFERVESCENT TABLET

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Abstract: Cola (*Cola nitida* A.Chev) have an effect of central nervous stimulant, usually formulated as soft drink. To lowering production and shipping cost, cola was formulated as effervescent tablet. The aim of this research was to know concentration of PVP K-30 as binder in tablet effervescent formulation. Cola extract was obtained from percolation by alcohol 95% of cola seed powder. Effervescent tablet of cola extract was made by wet granulation with concentration of PVP K-30 as binder was 1%, 3%, and 5%. Tablet weight was 1 gram contain of cola extract 31,25%. Evaluation of granule quality consist of moisture content, flow rate, repose angle, and compressibility, whereas tablet quality was hardness, disintegration time, friabilitas and uniformity of weight. Based on the data, formula with 1%concentration of PVP K-30 give the better result.

Keywords: cola (*Cola nitida A.Chev*) seed, effervescent tablet, PVP K-30

INTRODUCTION

Cola (*Cola nitida* A. Chev) was first consumed by the people of Africa by way of chewed as stimulantia, resisting hunger and to reduce fatigue (Ettarh *et al.*, 2000). Traditionally, a cola is used as a medicine and tonic headache with approximately five grams of cola nut powder 0.5 cups brewed with hot water, cooled and filtered, the filter taken at the same time (The Ministry of Health of the Republic of Indonesia, 1991). Pharmacological behavioral tests on rats showed cola nut stimulantia effect on the central nervous system (Ettarh *et al.*, 2000).

Cola nut contains the alkaloid xantin (kofein 1 to 2.5%, theobromine, theophylline), glucoside (kolantin, kolatein), carbohydrates, fats, tannins, red pigments (antocyanin) and a lipase (Tjitrosoepomo, 1994).

Cola is generally formulated as a non-alcoholic beverages are very popular around the world. One drawback perfomed liquid (drink) on the market are relatively expensive cost of transportation is therefore necessary to find another alternative dosage form that is more compact so that it can reduce production costs. One alternative is made with consideration of effervescent tablets is quite easy and practical use by adding water and then crushed tablets will release CO_2 gas that will provide fresh taste when drunk. CO_2 gas bubbles will also accelerate the dissolution of the ingredients in cool water. Transportation costs relative tablet cheaper than liquid preparations.

Effervescent tablet is a tablet that can release gas after contact with water. Gas bubbles that are a result of chemical reaction between the acid and alkaline. Acid is often used is citric acid, and sodium bicarbonate as base. Citric acid is easily soluble in water, high-strength acid, can form good granules and have the easy flow properties. Sodium bicarbonate can dissolve completely in water, is inexpensive, commercially available and are also easy to flow (Lieberman *et al.*, 1989).

The selection of the binder type and concentration is critical for the formulation of effervescent tablets. Binder that can be used must be soluble in water so that the resulting solution should be clear then in this study used PVP K-30. Concentrations commonly used are 1-5%, low concentrations causes fragile tablets whereas high

concentrations cause the tablet difficult destroyed. Therefore in this study used concentrations of 1, 3dan 5%. Concentration ratio was carried out to determine the concentration of PVP K-30 is good enough as a binder for the effervescent tablets in terms of physical quality test tablets.

MATERIAL AND METHOD

Equipment: Percolator, oven (WTB Binder Germany), TLC plates (Merck, Germany), porcelain crucible, a water bath scales, Moisture Balance, thermometer, UV light 254 nm and 366 nm (Camag TLC Scanner, Germany), chamber (Merck , Germany), microscope, single punch tablet machine (RRC), Schleuniger Hardness Tester, Tester Friabilator Erweka, Brookfield viscometer and other supporting equipment.

Material: Beans cola or *Cola nitida A. Chev,* rubra varieties obtained from the Medicinal Plant Research Institute (BPTO) Tawangmangu Solo. Additional materials unless otherwise stated have a pharmaceutical grade which include citric acid (Brataco), sodium bicarbonate (Brataco), PVP K-30 (BASF, Germany), lactose (DMV International, Netherlands), sodium benzoate (Wuhan Organic Chemicals, China), polyethylene glycol 6000 (Japan Sino Chemical, Japan), alcohol 96% (PT Aneka Kimia Nusantara, Indonesia).

Standardization of crude drug quality

Crude drugs used before the standardization of research first conducted including: test appearance, qualitative, ash content, water content, loss on drying.

Making Extracts

To determine the concentration of alcohol used as solvent for the extraction of orientation first performed using a concentration of 30, 50, 70 and 96%. Results indicate the orientation of 96% alcohol could increase the number and clarity of stains or stains the best thickness so that the subsequent extraction process using 96% alcohol solvent. Crude drug that has been milled into powder weighed as much as 2 kg, moistened with alcohol solvent 96% during the three hours. Moist powder which is inserted percolator and add 96% alcohol until the residue is dripping clear or residues have not left their mark on the paper if evaporated. Perkolat generated evaporated on a water bath at a temperature not exceeding 50°C to obtain viscous extract, then added lactose as filler and dried in an oven at a temperature of 50°C to obtain dry extract. The resulting powder must be crushed and sieved with 100 mesh sieve. The resulting dry extract was weighed and used as active ingredients for effervescent tablet formulations. Dry extract produced prior to use standardized test done first.

Extracts Weight Determination for Each Tablet

Cola nut powder required for a headache remedy and tonic: 5 g / day (Dep Kes RI, 1991). Cola nut powder that is extracted is 2000 g, equivalent to 500 g of dry extract. Dried extract of cola nut 500g/2000g X 5g = 1.25g.

To be not too large tablets, made four tablets taken at once so that the content of dry extract per tablet = 312.5 mg. Each formula is made three batches and each batch of 200 tablets.

Table 1. Formula effervescent per tablet

No	Component	Formula A(g)	Formula B(g)	Formula C (g)
1.	Dry extract	0.3125	0.3125	0.3125
2.	Citric acid	0.25	0.25	0.25
3.	Na bicarbonate	0.325	0.325	0.325
4.	PVP K-30	0.01	0.03	0.05
5.	Sucrose	0.0515	0.0315	0.0115
6.	PEG 6000	0.05	0.05	0.05
7.	Na Benzoate	0.001	0.001	0.001

Production Method

Granulation method used in the study were wet granulation method with non-reactive liquids (alcohol). Drying of granules made in the oven at a temperature of not more than 50 ° C within 18 hours to 24 hours. Granulation process is divided into two parts: the part of acid and alkaline. Section consists of a mixture of acid half of the dry extract with citric acid which has been finely crushed, plus half of the sodium benzoate and a half parts of sucrose, plus half of the PVP K-30, then 96% alcohol added to the mass formed granules, sieved with a sieve 18 mesh, is inserted in the oven at 500C until dry, sieved again with a 20 mesh sieve. Base part consists of a mixture of half of the dry extract with sodium bicarbonate, plus half of the sodium benzoate and a half parts of sucrose, plus half of the PVP K-30, then 96% alcohol added until a granular mass, sieved with 18 mesh sieve, was added to in the oven at 500C until dry, sieved again with a 20 mesh sieve. Part of acids and bases are mixed until homogeneous parts in a hot mortar, placed in 500C oven until dry, then test the physical quality of granules which include: Determination of moisture content, flow time, dwell angle and compressibility of granules. Granule eligible added PEG 6000 which was 100 mesh sieved and then mixed homogeneous done tabletasi using a single punch tablet machine. Tablet was tested and the physical quality of the data analysis using anova followed, when there are significant differences continued LSD (Least Significant Difference Procedure).

RESULTS

Standardization of crude drug test results as shown in Table 2 and the dried extract in Table 3.

Table 2. Standardization of Crude and Kola Seed Extract (Dep Kes RI, 1980)

No	Test	Standard	Result	Note
1	Descriptions of Form: Color: Taste: Odor:	 Powder Chocolate Slightly bitter Typical colas	 Powder Chocolate Slightly bitter Typical colas	 + + + +
2	Identification + 5 drops of H2SO4 + 5 drops of concentrated HCl + 5 drops of 5% NaOH + 5 drops of 25% NH4OH + 5 drops of FeCl3	 Light brown Light brown Blue Yellow brown Blue	 Light brown Light brown Blue Yellow brown Blue	 + + + + +
3	Ash content	Not more than 4%	3,6%	+
4	Loss on Drying	Not more than 10%	8,7%	+
5	Moisture Content	Not more than 10%	8,0%	+

Table 3. Standardization of Dry Extract and viscosity of viscous extract.

No	Observation	Result
1	Descriptions of Form: Color: Taste: Odor:	 Powder Brownish white Slightly bitter Typical colas
2	Viscosity	9.83 ± 0.153 Poise

The plant material unwound before use research conducted at the Research Institute of Medicinal Plants (BPTO) Tawangmangu Solo, to know that the bulbs used in this study according to the sample, which was intended. Results showed all the bulbs standardized examination that meets the requirements of Materia Medika feasible to use for further research. The product quality is largely determined the quality of crude drugs used. Tests for moisture content specified in relation to the possibility of mildew and mold growth, degradation by the enzyme reaction of the active substance in the bulbs. Microorganism growth does not occur if the water content in the bulbs is less than or equal to 10% (Soetarno & Soediro, 1994).

Extraction process used in this study with percolation as cola nut and contains glucoside kolatin, kolatein unstable on heating. Granulation method used is wet granulation with a non-reactive alcohol solvent with a consideration to avoid the occurrence of effervescent reaction and avoid high temperatures during drying granules thus the possibility of decomposition of active ingredients can be avoided.

Table 4. Granule Quality Test Results

No.	Test	Standard	Formula A	Formula B	Formula C
1	Moisture Content	≤10 %	7.04 ± 0.129	7.13±0.085	7.72±0.183
2	Flow rate	≤ 10 detik/100g	9.46±0.338	9.63±0.165	9.79±0.150
3	Repose Angle	25 – 40°	33.47±0.692	36.53±0.930	39.20±0.055
4	Compresibility	5 – 15%	12.52±0.554	11.65±0.353	10.57±0.351

Granule quality test results generated as shown in table 4 shows the formulas A, B and C have the flow properties and compressibility good so hopefully the problem does not occur in the process of granule compression. Tablet was tested quality as shown in Table 5.

Table 5. Tablet Physical Quality Test Results

No.	Test	Standard	Formula A	Formula B	Formula C
1.	Weight	F. Ind. III	1002.86±0.525	1003.98±4,268	1006.00±3.486
2.	Uniformity	≥ 8 Kgf	8.85±0.095	15.60±0.163	22.90±0.089
3.	Hardness	1 – 2	1.50±0.061	2.01±0.172	2.11±0.135
4.	Disintegration	menit	0.80±0.055	0.63±0.050	0.48±0.020
5.	Time	< 1.0%	6.97±0.153	7.04±0.147	7.26±0.197
	Friability	<10%			
	Moisture Content				

Formula weight uniformity test results A, B and C were 20 tablets no weight deviations greater than 5% according to the requirements of Pharmacopoeia Indonesia III, the results of the above because all the formulas have a good flow properties so that the granules into the hole filling the die is relatively uniform.

Tablet hardness test results of all formulas have a tablet hardness over 8 kgf (Pharos, 1992). The harder the better an effervescent tablet disintegration time and the vulnerability of origin requirements. Anova test results with $\alpha = 0.05$ showed no significant difference because the calculated F> F table (11399.23> 5.14). Least significant difference test showed violence tablets Formula A <B Formula <Formula C.

Test results of disintegration time qualifying while the formula A Formula B and C are not eligible (Lieberman et al., 1989). Tablet friability test results showed all eligible formula is less than 1.0% Banker & Anderson, 1994). Anova test results with $\alpha = 0.05$ showed no significant difference because the calculated F> F table (47.90> 5.14). Least significant difference test showed the fragility of Formula A> Formula B> Formula C. The water content test effervescent tablet formulation meets all the requirements of less than 10% (Soetarno & Soediro, 1994). Viewed from the physical quality tests show the resulting effervescent tablets Formula A with the concentration of PVP K-30 as much as 1% is the best formula.

CONCLUSION

Based on the results cola effervescent tablet formulations with different concentrations (1, 3 and 5%), PVP K-30 as a binder, it can be concluded that the formula that using PVP K-30 with a concentration of 1% is the best formula.

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