EXTRACTION OPTION ETHANOL-WATER FOR EURYCOMANON CONCENTRATION ON PASAK BUMI ROOT WITH SIMPLEX LATTICE DESIGN METHOD

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ABSTRACT

Background: Eurycomanon an active substance from the roots of the pasak bumi used to treat cancer. The compounds present in very small amounts that need to be optimized solvent.

Objective: The purpose of this study is to optimize the extraction method of eurycoma or *pasak bumi* roots using simplex lattice design.

Methods: One gram of root powder macerated pasak bumi each in 5 ml of solvent, with 3 different solvents, namely: water, ethanol 50 %, 70 % and 96 % ethanol. Maceration levels determined by HPLC with fased silica gel 60 F_{254} and phase motion methanol: chloroform (8: 2), with a maximum length of 301 nm.

Outcome Measured: Levels obtained from the laboratory scale and then put into the equation Simplex Lattice Design (SLD) by incorporating response levels obtained, it can be calculated price coefsien ab and ab. Value of Y (response) for each variation mixtures A and B is calculated, so that the profile can be described.

Results: From the results obtained, the optimum composition of the fluid eurycomanom quote from the roots of the earth peg in a semi industrial scale is 100 % water conformed to the equation, simplex lattice design with the equation Y = 71693.153 [A] + 7766.246 [B]+ 7721.57 [A] [B].

Conclusion: Prediction results obtained between response levels on eurycomanon laboratory scale with statistical analysis by t test showed differences are not significant, so the simplex lattice design equations that can be obtained be used to predict the optimum ratio of ethanol-water.

Keywords: Root Pasak Bumi (Eurycoma longifolia, Jack), Eurycomanon, Simplex Lattice Design

INTRODUCTION

Cancer is one of the major diseases causing death. In 2010, deaths from cancer in the United States reached 25 % increased 7 % over the last 10 tahn (Brooks, 2011). In Indonesia, ranked sixth cause of cancer death (Tjindarbumi and Mangunkusumo, 2002).one plant efficacious as anticancer there was the root of the *pasak bumi*. However, if the plant is consumed in excess can be nefrotosik (Chan and Choo, 2002). This indicates the nature of the active compounds in the plant roots *pasak bumi* not only selectively against cancer cells (Bhat and Karim). Extract active compounds need to be very high because of its potential as an anticancer.

Plant roots contain several *pasak bumi* efficacious anticancer compounds. Compounds contained in the roots of the 9 - methoxycanthin dominant - 6one (Rosli et al., 2009), eurycomalacton (Chan et al., 1992), squalene (Morita et al., 1993), as well as eurycomanon (Ang et al., 2002). These compounds have antimalarial effects (Kuo et al., 2004), antitumor (Nurhanan et al., 2005), and chemopreventive (Conscience, et al., 2009). This compound is acidic so it can interact the premises chitosan (Kumar et al., 2005) so that the formula will be obtained chitosan nanoparticle - targeting compounds of the roots of the *pasak bumi* anticancer anticancer properties that have a high selectivity. Eurycomanon levels in plants by only 0.5%. Based on these two needs to optimize extraction by solvent that produces most of the levels, Ethanol and Water is commonly used as solvent extract active compounds in the extracts of natural products industry. Comparison of ethanol and water need to be sought to determine the extract eurycomanon maximum yield.

METHODS

Making a series of standar dsolution

Standard eurycomanon much as 125 mg, dissolved in distilled water : methanol (1:1) to 25 ml (mother liquor = 5 mg / ml) made a series of standard solution of 5mg/ml; 4mg/ml; 3mg/ml; 2mg/ml; 1mg/ml. Standard solution is then injected into the HPLC column, silica gel 60 F_{254} with a mobile phase of methanol : chloroform (8:2). The next area is calculated and linear regression equation to be used as a standard curve.

Optimization of fluids with the method simplex lattice design

Weighed 1.0 grams of powdered root *pasak bumi*, as much as 3 times and enter separately into flacon. Powder used in this study advance lipid extract with petroleum ether. Furthermore, each flacon plus different solvents are: water, 50 % ethanol and 96 % ethanol as much as 5 ml and macerated for 20 hours while often shaken, filtered, then each matched to the volume of 5 ml in a pint flask. The drawback with the solvent flowed through the dregs to 5 ml. Parameter optimization results is the level of the active substance is eurycomanon. Determination of the active compounds was done by HPLC with a C - 18 stationary phase and mobile phase pH buffer - acetonitrile and comparison optimized first (Choo and Chan, 2002).

Eurycomanon levels obtained from each solvent and then analyzed using simplex lattice design method to determine the composition of the ethanol - water solvent optimum eurycomanon to sum up the *pasak bumi* roots. Parameter optimization results is the level of the active substance is eurycomanon. Determination of the active compounds was done by HPLC with a C - 18 stationary phase and mobile phase pH buffer - acetonitrile and comparison optimized first (Choo and Chan, 2002).

RESULTS AND DISCUSSION

Preparation of the main ingredients

The main materials used in this study are the root of the *pasak bumi* Kalimantan. In a subsequent sample processing used three types of solvents or liquids that extract for laboratory scale is water, 50% ethanol and 96% ethanol, while for semi industrial scale using 50% ethanol, 70% ethanol and 96% ethanol by maceration method. Prior to extract eurycomanon in the sample, first performed lipid extraction samples with petroleum ether. This is to sum up the fat and

other non-polar compounds so it will not interfere with subsequent assays eurycomanon. Once the samples are free of fat and completely dry and free of residual petroleum ether, then made extract eurycomanon with different solvents using the maceration method. Eurycomanon defined in this study is hydrolyzed eurycomanon counts as eurycumanon.

Identification Eurycomanon

Identification eurycomanon qualitatively performed to determine the presence of eurycomanon in samples tested. If proven the existence eurycomanon using qualitative identification can then proceed to perform the assay eurycomanon in samples with three kinds of solvents or liquids extraction are water, ethanol 50% and 96% ethanol by maceration using HPLC. Identification eurycomanon scanning the HPLC used as a comparison compound eurycomanon and maximum wavelength measurements on samples of the *pasak bumi* roots, so that has been known to be able to identify whether the same sample obtained with reference compounds. Provided that eurycomanon more extract in 100% water. Calculation of each solvent eurycomanon levels using standard curves that exist on the same plate. Extraction eurycomanon levels that using ethanol 96%, is 1.45%, levels that extraction eurycomanon with ethanol 50%, which is 1.62% and the extraction eurycomanon levels with water, which is 1.39%. When the calculation is based on simplex latice design formulated with:

Y = a [A] + b [B] + ab [A] [B]
With A = water and B = ethanol

For A = water 100%, B = ethanol 0;
Y = 71693.153;
Y = a[A]+b[B]+ab[A][B]
71693,153=a[1]+b[0]+ab[1][0]
a=71693,153

For A=water 0; B=ethanol 100%;
Y=7766,246
Y = a [A]+b[B]+ab[A][B]
7766, 246= a[0]+b[1]+ab[0][1]
b=7766, 246

For A=water 50%; B=ethanol 50%;
Y=37799,307
Y = a[A]+b[B]+ab[A][B]
37799,307=a[0,5]+b[0,5]+ab[0,5][0,5]
37799,307={71693,153[0,5]}+
{7766,246[0,5]}+0,25ab
ab=41660,092

SLD equation obtained is:
Y = 71693,153 [A]+7766,246 [B]+ 7721,57[A][B]

The results of calculations by the content acquisition solution of water and ethanol are shown in Table. I. From Table I seen that the highest levels of eurycomanon obtained on 100 % water. Prediction Results Calculation and Experimental Results Simplex Lattice Design to determine the validity of the results of equations simplex lattice design on a laboratory scale so that the equation can be used on a different formula, then analyzed on a semi- industrial scale to 50% ethanol, 70% ethanol and 96% ethanol with the response simplex lattice design results obtained on a scale laboratory. The analysis is using SPSS by t test at 95% of confidence level. From the t-test results are obtained, the response levels eurycomanon extracted with 50% ethanol, 70% ethanol and 96% ethanol in equation simplex lattice design gained significance on 0.16. This shows that equation simplex lattice design on a laboratory scale calculations can be used to predict the ratio of ethanol - water.

Table I. Eurycomanon levels results maceration with water and ethanol solvent

A (Water)	B (Ethanol)	Average Level (µg/ml)
0	1	7.766,246
0,1	0,9	14.853,878
0,2	0,8	21.786,987
0,3	0,7	28.565,802
0,4	0,6	35.190,186
0,5	0,5	41.660,092
0,6	0,4	47.975,567
0,7	0,3	54.136,601
0,8	0,2	60.143,273
0,9	0,1	65.995,266
1	0	71.693,153

CONCLUSION

Based on the calculation method of simplex lattice design the most optimal solvent to sum up the roots of the *pasak bumi* eurycomanon is solvent water 100 % .

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