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Development of Kencur Extract Ice Cream Formula (*Kaempheria Galanga L)* as an Anti-Inflammatory in Obesity Adolescents

Enik Sulistyowati[1], Yuwono Setiadi[2], J. Supadi[3], J. Abdul Salam[4]

[1,2,3] Department of Nutrition, Poltekkes Kemenkes Semarang, Semarang, Indonesia

[4] Department of Radiology Technology, College of Medical Technology Bacha Khan Medical College (BKMC) Mardan, Pakistan.

ABSTRACT

Background: Metabolic syndrome associated with indicators of inflammation such as C-Reactive Protein (CRP). Elevated CRP levels in obese adolescents is an indicator of metabolic disorders. Giving kencur extract to adolescents with metabolic disorders can reduce CRP levels. Increasing the acceptance of kencur in adolescents can be done by supplementing kencur extract in ice cream. The aim of the research was to obtain kencur extract supplementation ice cream products, with the best physical, chemical and organoleptic characteristics. It is hoped that this kencur extract ice cream can be used as an anti-inflammatory in obese adolescents.

Research methods: The research design was Completely Randomized Design. There are 5 treatments of ice cream. Each treatment with a volume of 250 ml. The physical and chemical properties and organoleptic properties of kencur extract ice cream were observed. The statistical test used to determine differences in physical properties is ANOVA. While the test used to determine organoleptic differences is the Friedman test.

Research result: All treatments had a pH of 7. Dissolved solids in ice cream ranged from 43.5% - 44.58%. The viscosity of ice cream ranges from 0.355 mN,m - 0.517mN,m. Ice cream overrun ranges from 110% - 168%. Ice cream melting speed ranges from 5.75 minutes - 8.975 minutes. The content of energy, protein, fat and carbohydrates. The more the addition of kencur extract the organoleptic properties of ice cream, the less preferred it is.

Conclusion: Ice cream with high acceptability is one added with 2700 mg of kencur extract and 2900 mg of kencur extract.

KEYWORDS: Ice cream, kencur extract, anti-inflammatory, obese adolescents

ARTICLE DETAILS

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A. BACKGROUND

Metabolic syndrome is a group of metabolic disorders in the body. This collection of conditions includes obesity, dyslipidemia, hypertension and hyperglycemia. This situation can develop into cardiovascular diseases such as coronary heart disease and stroke, as well as type 2 diabetes mellitus and other diseases such as cancer. Based on epidemiological data on children aged 4-18 years, 17.4% of children showed metabolic syndrome with 80.6% having low HDL levels (Widyastuti, 2016).

The metabolic syndrome is associated with inflammatory indicators such as*C-Reactive Protein* (CRP). Elevated CRP levels in adolescents is an indicator of metabolic disorders. CRP is a predictor of cardiovascular disease (Yekti, et al, 2014). Research in Semarang showed a decrease in HDL cholesterol levels, an increase in BMI and an increase in percent body fat followed by an increase in CRP. However, an increase in lipid profile is not associated with an increase in CRP (Mexitalita et al, 2009).

One of the plants that is widely used by the people of Indonesia as a functional herb is kencur (*Kaempferia galanga L.*). The rhizome of kencur is often used as a painkiller and anti-inflammatory by Indonesian people. According to Andriyono (2020) Kencur rhizome can be used as an anti-inflammatory. Kencur rhizome has bioactive substances including flavonoids, saponins, and essential oils which can function as anti-inflammatories. Kencur has non-steroidal anti-inflammatory substances. Flavonoids can inhibit arachidonic acid metabolic pathways, prostaglandin formation and histamine release in inflammation. Saponins

are detergents which are thought to be able to interact with many lipid membranes such as phospholipids which are precursors of other prostalglandin mediators of inflammation. Essential oils can inhibit platelet aggregation by inhibiting the formation of thromboxane so that they have an anti-inflammatory effect (Andriyono, 2020).

Increasing the acceptance of kencur in adolescents can be done by supplementing kencur extract in food products. Processed food products that are very well known and popular with teenagers are ice cream. Ice cream is one of the most popular food products in the world. Ice cream is a frozen dish that has a high nutritional content and is enjoyed by many people. Ice cream consumers are not limited to teenagers but are widespread among children, adults and parents (Achyadi and Hervelly, 2020). The results of the study found that the methanol extract of kencur (*K. galanga*) has anti-inflammatory activity in experimental animals. Likewise Nurani's research*et al* (2020) found that the ethanol extract of kencur contains ethyl p-methoxycinnamate (EPMC) and has anti-inflammatory activity by inhibiting protein denaturation (Nurani, 2020).

The formulation of the problem that we will find is how the effect of the addition of kencur extract on the physical, chemical and organoleptic quality of the kencur extract ice cream is the goal in the following report to determine the effect of the addition of kencur extract on the physical, chemical and organoleptic quality of the kencur extract ice cream the benefits contained in In the following study, increased CRP levels in obese adolescents is an indicator of metabolic disorders. Giving kencur extract as an anti-inflammatory is expected to reduce CRP values. Development of kencur extract into kencur extract ice cream as a functional food as an anti-inflammatory in obese adolescents.

This research strongly supports the achievements of the higher education research strategic plan (Poltekkes Kemenkes Semarang). This research strongly supports the development of the local wisdom program of the Semarang Health Polytechnic.

1. METHOD

The research method to be carried out is true experiment research (pure experiment). Experimental research is a method used to find the effect of certain treatments on others under controlled conditions. The independent variable that will be used in the following research is the independent variable in the study is the composition of the kencur extract. The dependent variables included the nutritional content of the kencur extract ice cream, the content of the bioactive substances of the kencur extract ice cream and pH, solids analysis, viscosity, overrun, melting speed and organoleptic properties of the kencur extract ice cream. The bioactive substance content of kencur extract will also be analyzed.

The experimental design used a completely randomized design (CRD), with 5 treatments of kencur extract ice cream. The number of repetitions is determined by the sample formula:

$$(t-1) \times (r-1) \geq 15$$
$$(5-1) \times (r-1) \geq 15$$
$$r-1 \geq 15 / 4$$
$$r \geq 4$$

Information :

t: treatment

r: repetition

Table 1. Experimental design

Treatment			**Test**		
A	***B***		***C***	***D***	***E***
1	*A1*	*B1*	*C1*	*D1*	*E1*
2	*A2*	*B2*	*C2*	*D2*	*E2*
3	*A3*	*B3*	*C3*	*D3*	*E3*
4	*A4*	*B4*	*C4*	*D4*	*E4*

Information:

A = Control

B = Kencur extract ice cream 1

C = Ice cream extract kencur 2

D = Ice cream extract kencur 3

E = Kencur extract ice cream 4

The materials used in this study were kencur extract obtained from the Sido Muncul factory, Semarang district. The ingredients for making ice cream include full cream UHT milk, skim milk, local granulated sugar and cow gelatin.

Based on Hasana's research (2011) that the administration of kencur extract to rats is 45 mg/kg BW/day. If the human body weight is 60 kg, the kencur extract needed is 2700 mg/day. If in 1 day a person drinks 600 ml of ice cream, then the ingredients needed to make ice cream are 250 ml. So the kecur extract needed in 250 ml of ice cream ingredients is 2700 mg

Table 2. Material

No	*Material*	**Treatment**				
		A	*B*	*C*	*D*	*E*
1	*Kencur Extract(mg)*	*0*	*2600*	*2700*	*2800*	*2900*
2	*skimmed milk (g)*	*60*	*60*	*60*	*60*	*60*
3	*SP(%)*	*2*	*2*	*2*	*2*	*2*
4	*Sugar (g)*	*30*	*30*	*30*	*30*	*30*
5	*Cornstarch (g)*	*5.0*	*5.0*	*5.0*	*5.0*	*5.0*
6	*Salt (mg)*	*120*	*120*	*120*	*120*	*120*
7	*Water (%)*	*59*	*59*	*59*	*59*	*59*

Source: *Juwita RI et al (2021) and (Hasana, 2011)*

There is a procedure used in the following research, namely Kencur extract was tested for proximate and bioactive substances in the Chemistry Laboratory of UNIMUS Semarang, the Chemistry Laboratory of UNIKA Sugijapranata Semarang and the Laboratory of UNDIP Semarang. Making kencur extract ice cream, testing the physical properties of ice cream and organoleptic tests of ice cream were carried out in the Food Technology Laboratory, Department of Nutrition, Health Polytechnic, Ministry of Health, Semarang.

Data analysis used in the following research Univariate analysis was processed descriptively and presented in the form of narration and tables. ANOVA generalized linear model (GLM) test was used to determine differences in physical and chemical properties between treatments of kencur ice cream extract. The Friedman test was used to determine differences in organoleptic properties between treatments of kencur ice cream extract.

2. RESULTS AND DISCUSSION

Observation of the physical quality of kencur extract ice cream included pH, solids, viscosity, overrun and melting speed. Here are the overall results.

Table 3. Physical Quality of Kencur Extract Ice Cream

Physical Quality of Kencur Extract Ice Cream	*Addition of Kencur Extract (mg)*					
	0	*2600*	*2700*	*2800*	*2900*	*p value*
pH	*7*	*7*	*7*	*7*	*7*	*1.000*
Solids (%)	*43.5*	*44.5*	*44.25*	*45*	*44.58*	*0.843*
Viscosity(mN,m)	*0.355*	*0.501*	*0.463*	*0.460*	*0.517*	*0.538*
Overrun(%)	*110.0*	*139.0*	*151.4*	*154.0*	*168.0*	*0.101*
Melting Speed(minutes)	*8.3*	*6.975*	*5.75*	*8.975*	*8.088*	*0.698*

Based on table 3 it can be seen that the pH of the ice cream is all neutral, namely 7. There is no difference in the pH of the ice cream. In this study, there were no ingredients that tasted sour, so all of the ice cream had a neutral pH. The dissolved solids in ice cream range from 43.5% to 44.58%. There was no difference in total dissolved solids between the ice creams. The viscosity or thickness of ice cream ranges from 0.355 mN,m to 0.517mN,m. The overrun or development of ice cream is between 110% and 168%. The more addition of kencur extract the volume expands, but not significantly different. Ice cream melting speed is calculated in minutes. Ice cream melting speed ranged from 5.75 minutes to 8.975 minutes. There is no difference in melting speed between ice creams

A. Acceptance Favorite Ice cream Extract Kencur

The acceptability of extract ice cream preferences includes color, aroma, taste and texture. The complete results are shown in table 4. Based on the results of the data normality test for all variables, a p value <0.05 was obtained, so that all data was not normally distributed. The test used to find out the difference in acceptability is the Friedman test.

Table 4. Average score of acceptance of kencur extract ice cream

Acceptability	Addition of Kencur Extract (mg)					
	0	2600	2700	2800	2900	p value
Color	4.40±0.77	3.77±0.90	3.50±0.94	3.50±1.04	3.47±0.94	0.000*
Aroma	3.97±0.81	3.37±0.96	3.50±0.78	3.37±0.76	3.33±0.88	0.043*
Feel	4.00±1.08	3.07±1.17	3.23±1.04	3.00±0.98	3.23±1.10	0.039*

Texture	3.67±1.42	3.60±1.07	3.83±0.95	3.97±0.85	3.87±1.13	0.471
Receiving power	4.01±0.67	3.45±0.65	3.51±0.49	3.45±0.53	3.48±0.62	0.007*

Description: *significantly different at α=0.05

Based on table 4 it can be seen that the color acceptability score of kencur ice cream ranges from 3.47±0.94 to 4.40±0.77. The more kencur extract the color of the ice cream is added, the less liked it is. There is an effect of galingale extract on color acceptability of kencur extract ice cream (p=0.000). The results of the multiple comparison test for acceptability of ice cream colors are shown in table 5.

Table 5. Multiple Comparison Test Results for Color Acceptability

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.003*	0.001*	0.001*	0.001*
2600	0.003*		0.142	0.208	0.199
2700	0.001*	0.142		0.917	1.000
2800	0.001*	0.208	0.917		0.904
2900	0.001*	0.199	1.000	0.904	

Description: *= significantly different at α=0.05

Based on table 5 it can be seen that the color of ice cream without the addition of kencur extract was significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur is preferable to the one added with kencur extract.

Based on table 4, it can be seen that the acceptance score for the aroma of kencur ice cream ranges from 3.33±0.88 to 3.97±0.81. The more the addition of kencur extract, the more disliked the aroma of ice cream. There is an effect of giving kencur extract on the acceptability of the aroma of kencur extract ice cream (p=0.043). The results of the multiple comparison test for acceptance of ice cream aroma are shown in table 6.

Table 6. Multiple Comparison Test Results for Aroma Receptivity

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.013*	0.018*	0.005*	0.009*
2600	0.013*		0.465	1.000	0.942
2700	0.018*	0.465		0.234	0.253
2800	0.005*	1.000	0.234		0.748
2900	0.009*	0.942	0.253	0.748	

Description: *= significantly different at α=0.05

Based on table 6 it can be seen that the aroma of ice cream without the addition of kencur extract was significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur is preferable to the one added with kencur extract.

Based on table 4, it can be seen that the score of acceptance of kencur ice cream ranges from 3.07±1.07 to 4.00±1.08. The more the addition of kencur extract, the more disliked the ice cream flavor. There is an effect of giving kencur extract on the acceptability of the aroma of kencur extract ice cream (p=0.039). The results of the multiple comparison test for acceptance of ice cream flavors are shown in table 7.

Table 7. Results of the Multiple Comparison Test of Taste Acceptance

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.007*	0.007*	0.004*	0.028*
2600	0.007*		0.614	0.960	0.535
2700	0.007*	0.614		0.265	0.923
2800	0.004*	0.960	0.265		0.331
2900	0.028*	0.535	0.923	0.331	

Description: *= significantly different at α=0.05

Based on table 7 it can be seen that the taste of ice cream without the addition of kencur extract is significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur is preferable to the one added with kencur extract.

Based on table 4 it can be seen that the texture acceptance score of kencur ice cream ranges from 3.67±1.17 to 3.97±0.85. There is no effect of kencur extract on the acceptance of kencur extract ice cream texture (p=0.471).

Based on table 4 it can be seen that the average overall acceptability score ranges from 3.45±0.65 to 4.01±0.67. There is an effect of kencur extract on the acceptability of kencur extract ice cream (p=0.007). Ice cream with the addition of kencur extract which has a high acceptability score is that added with kencur extract 2700 with a score of 3.51±0.49 and added kencur extract 2900 with a score of 3.48±0.62. The results of the multiple comparison test for ice cream acceptability scores are shown in table 8.

Table 8. Overall Acceptance Multiple Comparison Test Results

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.002*	0.000*	0.002*	0.003*
2600	0.007*		0.735	0.878	0.727
2700	0.007*	0.735		0.688	0.923
2800	0.004*	0.878	0.688		0.948
2900	0.028*	0.795	0.727	0.948	

Description: *= significantly different at α=0.05

Based on table 8 it can be seen that the taste of ice cream without the addition of kencur extract is significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur is preferable to the one added with kencur extract.

B. Sensory Receptivity of Kencur Ice Cream

The sensory acceptability of extract ice cream includes color, aroma, taste and aftertaste. The full results are shown in table 9. The range of sensory acceptance scores ranges from 1 to 7. Scores range from very weak (1) to very strong (7). Based on table 9 it can be seen that the sensory acceptance of white color ranges between 4.37±1.25 to 5.83±0.70. The sensory perception of color with the highest score was without the addition of kencur extract, namely 5.83±0.70. This shows that the whitest color is ice cream without kencur extract added. There is an effect of galingale extract on white sensory perception of kencur extract ice cream (p=0.000).

Table 9. Average Sensory Score

sensors	Addition of Kencur Extract (mg)					
	0	2600	2700	2800	2900	p value
White color	5.83±0.70	4.67±1.06	4.43±1.19	4.37±1.25	4.57±0.97	0.000*
Kencur aroma	1.57±0.73	2.97±1.50	2.43±0.97	2.57±0.97	2.37±1.40	0.000*
Kencur taste	1.93±1.17	4.93±1.44	4.13±1.28	4.23±1.36	3.83±1.46	0.000*
Kencur Aftertaste	1.90±1.40	4.13±1.57	3.90±1.40	4.10±1.58	3.67±1.58	0.000*

Description: *significantly different at α=0.05

The results of the multiple comparison test for sensory scores for the white color of the ice cream are shown in table 10. Based on table 10 it can be seen that the white color of the ice cream without the addition of kencur extract was significantly different from all the ice cream added with kencur extract. Ice cream without the addition of kencur is whiter in color compared to the one added with kencur extract.

Table 10. Results of the White Color Dual Comparison Test

Addition of Kencur Extract (mg)	**0**	**2600**	**2700**	**2800**	**2900**
0		**0.000***	**0.000***	**0.000***	**0.000***
2600	**0.000***		**0.154**	**0.208**	**0.199**
2700	**0.000***	**0.154**		**0.083**	**0.415**

2800	**0.000***	**0.083**	**0.277**		**0.233**
2900	**0.000***	**0.491**	**0.415**	**0.233**	

Description: *= significantly different at α=0.05

Based on table 9, it can be seen that the sensory acceptance of the aroma of kencur has a score range between 1.57±0.73 to 2.97±1.50. The sensory acceptance of kencur aroma that scored the highest was the addition of 2600 mg of kencur extract, namely 2.97±1.50. This shows that the ice cream with the sharpest aroma of kencur is ice cream with the addition of 2600 mg of kencur extract. There is an effect of giving kencur extract on the sensory acceptance of kencur aroma on kencur extract ice cream (p=0.000).

Table 11. Results of the Double Sensory Comparison of Kencur Aroma

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.000*	0.000*	0.080	0.020*
2600	0.000*		0.047*	0.145	0.080
2700	0.000*	0.047*		0.396	0.911
2800	0.080	0.145	0.396		0.492
2900	0.020*	0.080	0.911	0.492	

Description: *= significantly different at α=0.05

The results of the multiple comparison test of sensory scores for the aroma of kencur ice cream can be seen in table 11. Based on table 11 it can be seen that the aroma of kencur ice cream without the addition of kencur extract was significantly different from all ice cream added with kencur extract, except for the addition of 2800. Ice cream without the addition of kencur the aroma of kencur is the weakest compared to those added with kencur extract.

Based on table 9, it can be seen that the sensory perception of kencur has a score range between 1.93±1.17 to 4.93±1.44. The sensory acceptance of the taste of kencur with the highest score was the addition of 2600 mg of kencur extract, namely 4.93±1.44. This shows that the ice cream with the sharpest kencur taste is ice cream with the addition of 2600 mg of kencur extract. There is an effect of galingale extract on the sensory acceptance of kencur's taste in kencur's extract ice cream (p=0.000).

Table 12. Results of the Sensory Dual Comparison Test

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.000*	0.000*	0.000*	0.000*
2600	0.000*		0.011*	0.074	0.080
2700	0.000*	0.011*		0.770	0.303
2800	0.000*	0.074	0.770		0.158
2900	0.000*	0.080	0.303	0.158	

Description: *= significantly different at α=0.05

The results of the multiple comparison test for the sensory score of kencur ice cream taste are shown in table 12. Based on table 12 it can be seen that the taste of kencur ice cream without the addition of kencur extract was significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur has the weakest taste compared to the one added with kencur extract.

Based on table 9, it can be seen that the sensory acceptance of the aftertaste of kencur has a score range between 1.90±1.40 to 4.13±1.57. Aftertaste sensory acceptance with the highest score was the addition of 2600 mg kencur extract, namely 4.13±1.57. This shows that the ice cream with the sharpest aftertaste is ice cream with the addition of kencur extract 2600 mg. There is an effect of kencur extract on the acceptability of kencur aftertaste on kencur extract ice cream (p=0.000).

Table 13. Results of the Double Sensory Comparison Test for Kencur Aftertaste

Addition of Kencur Extract (mg)	0	2600	2700	2800	2900
0		0.000*	0.000*	0.000*	0.000*
2600	0.000*		0.472	0.903	0.108
2700	0.000*	0.472		0.360	0.385
2800	0.000*	0.903	0.360		0.077
2900	0.000*	0.108	0.385	0.077	

Description: *= significantly different at α=0.05

The results of the multiple comparison test of kencur aftertaste sensory scores for ice cream can be seen in table 13. Based on table 13 it can be seen that the aftertaste of kencur on ice cream without the addition of kencur extract was significantly different from all ice cream added with kencur extract. Ice cream without the addition of kencur, the aftertaste of kencur is the weakest compared to those added with kencur extract.

C. Chemical Quality of Kencur Extract and Ice Cream Extract of Kencur

The chemical quality of kencur extract and kencur extract ice cream includes the number of antioxidants, types of antioxidants consisting of flavonoids and saponins as well as essential oils. The results for the content of anti-oxidants and flavonoids and saponins examined were kencur extract powder and ice cream with the addition of 2700 mg of kencur extract and ice cream with the addition of 2900 mg of kencur extract. The antioxidant content of kencur extract and kencur extract ice cream can be seen in table 14.

Table 14. Chemical Quality of Kencur Ice Cream Extract

Chemical Quality of Kencur Extract Ice Cream	Addition of Kencur Extract (mg)		
	Powder the kencur extract	2700	2900
Antioxidant(%)	85.513	3.208	2.857
Flavanoid (ppm)	54466	255.082	148.894
Saponin(%)	1.428	2.461	2.355
Protein (%)		4.35	4.29
Water Level(%)		95.19	95.39
Ash Rate (%)		2.41	3.14
Fiber (%)		0.53	0.40
Fat (%)		0.24	0.26

The essential oil compounds contained in kencur extract are shown in table 15.

Table 15. Essential oil compounds contained in kencur extract

No	Compound	Abundance (%)
1	Asam Decanoate, methyl ester (CAS)	0.58
2	Pentadecane	0.23
3	Dodecanoic acid, methyl ester	2.01
4	2-Propenoic acid, 3-(4-methoxyphenyl)-, ethyl ester	1.49
5	2-Propenoic acid, 3-(4-methoxyphenyl)-, methyl ester	5.42

Table 16. Essential oil compounds contained in kencur extract (continued)

No	Compound	Abundance (%)
6	Tetradecanoic acid, methyl ester (CAS)	1.76
7	2-Propenoic acid, 3-(4-methoxyphenyl)-, ethyl ester	31.91

8	Hexadecanoic acid, methyl ester (CAS)	15.57
9	9,12-Octadecadienoic acid (Z,Z)-, methyl ester (CAS)	0.86
10	9-Octadecenoic acid, methyl ester,	20.69
11	9-Octadecenoic acid, methyl ester, (E)-	11.16
12	Octadecanoic acid, methyl ester	5.71
13	9,12-Octadecadienoic acid, methyl ester, (E,E)- (CAS)	0.85
14	Octadecanoic acid, 10-oxo-, methyl ester (CAS)	1.12
15	Eicosanoic acid, methyl ester (CAS)	0.65
	Amount	100

CONCLUSION

1) The pH of the ice cream is 7. The dissolved solids in the ice cream range from 43.5% to 44.58%. The viscosity or thickness of ice cream ranges from 0.355 mN,m to 0.517mN,m. Ice cream overrun ranges from 110% to 168%. Ice cream melting speed ranged from 5.75 minutes to 8.975 minutes.
2) The more kencur extract the color of the ice cream is added, the less liked it is. There is an effect of galingale extract on color acceptability of kencur extract ice cream (p=0.000).
3) The more the addition of kencur extract, the more disliked the aroma of ice cream. There is an effect of giving kencur extract on the acceptability of the aroma of kencur extract ice cream (p=0.043).
4) The more the addition of kencur extract, the more disliked the ice cream flavor. There is an effect of giving kencur extract on the acceptability of the aroma of kencur extract ice cream (p=0.039).
5) There is no effect of kencur extract on the acceptance of kencur extract ice cream texture (p=0.471).
6) The ice cream with the highest acceptability score was added with kencur extract 2700 mg with a score of 3.51±0.49 and those added with kencur extract 2900 mg with a score of 3.48±0.62.

SUGGESTION

1. Ice cream that will be given to obese teenagers should be added 2700 mg

REFERENCES

I. Achyadi NS and Hervelly, Respiani H. 2020. Comparison of Soybean Extract with Beetroot Porridge and Concentration of Coconut Milk on the Characteristics of Vegetable Ice Cream. Pasundan Food Technology Journal, Volume 7, No.2, Year 2020

II. Andriyono RI. 2020. Kaempferia galanga L. as an anti-inflammatory and analgesic. lham Journal of Health Volume 10, Number 3, November 2019 ISSN 2086-7751 (Print), ISSN 2548-5695 (Online) http://ejurnal.poltekkes-tjk.ac.id/index.php/JK 495

III. Chan, L. A. 2008. Making Ice Cream. Agromedia, Jakarta.

IV. Guillen LS, Garcia BH, Pita J, Garrido ND, Camacho GD, Rovira A. High-Sensitivity C-Reactive Protein is a Good Marker of Cardiovascular Risk in Obes Children And Adolescents. European Journal of Endocronology. 2008.159 R1-R4.ISSN 0804-4643.

V. Hasanah, A.N., Nazaruddin, F., Febrina, E. and Zuhrotun, A., 2011. Analysis of essential oil content and anti-inflammatory activity test of kencur rhizome extract (Kaempferia galanga L.).Journal of Mathematics & Science, 16(3), pp.147-152.

VI. Juwita, RI, Syauqy, Anjani, G and Afifah, DN, 2021. Analysis of the Nutrients of Stone Banana Ice Cream as a Functional Food to Prevent Colorectal Cancer. Journal Of Nutrition College. 10 (1) 10-17.

VII. Kusumawati, I., dan Yusuf, H. 2011. Phospholipid Complex as a Carrier of Kaempferia Galanga Rhizome Extract to Improve Its Analgesic Activity. Int J of Pharm and Pharm Sci. 3(1):1-3

VIII. Lee S, Hahn C, Rhee M, Oh JE, Song J, Chen Y, et al. 2012. Hula Hula Segmentation Analysis Based on Product Attributes in Surabaya. J Chem Inf Model. 2012;53(9).

IX. Mexitalia M, Utari A, Sakundarno M, Yamauchi T, Subagio HW, Soemantri A. 2009. Metabolic syndrome among obese adolescents.Indonesian Medical Media. 2009;43(6):300–305.

X. Mohanbabu, V.A, Shanbhag, T.K., Kumari, M., Bairy, K.L., & Shenoy, S., (2011). Evaluation of Antiiflamantory and Analgesic Actives of Alcoholic Extranct of Kaempferia Galanga in Rats. Indian J Physiol Pharmacol. 55 (1): 13 -24

XI. Nurani LH, Asahi A, Susanti H. 2020. Determination of ethyl para methoxycinnamate content and anti-inflammatory test of Kaempferia galangal, L rhizome extract by inhibition of protein denaturation method. Pharmaciana Vol.10, No.3, Nov 2020, Page. 381-390 ISSN: 2088 4559; e-ISSN: 2477 0256
DOI: 10.12928/pharmaciana.v10i3.15293

XII. Rismadinna, D. A. (2017). Anti-inflammatory Effects of N-Hexane Extract of Kencur Rhizome (Kaempferia Galanga L.) In Wistar Male White Rats Induced by Carrageenan. Unjani Bandung

XIII. Sari, Dewi Mulad, et al. 2013. Relationship of Fiber, Sodium and Physical Activity Intake of Obesity with Hypertension in Elementary School Children.*Journal of Nutrition College*. Flight 2 No. 4 Hall 467-473.

XIV. Sukmono, R.J. (2010). Overcoming Various Diseases with Herbs. PT Agromedia Pustaka. Jakarta.

XV. Umar, M.I, Asmawi, M,Z, Sadikun, A, Atangwho, I.J, Yam MF, Altaf R and Ahmed, A (2012). Bioactivity- Guided Isolation of Ethyl-p-methoxycinnamate, an Anti-infammatory constituent, form Kaempferia galangal L. Extracts. *J of Molecusles*. 17 (7) :8720-8734.

XVI. Umar, M.I, Asmawi, M,Z, Sadikun, A, Majid A, Al-Saude, F., Hassan L., Ahamed, M. (2014). Ethyl-p-methoxycinnamate isolated from Kaempferia galangal inhibits inflammation by suppressing interleukin-1, tumor necrosis factor-α, and angiogenesis by blocking endothelial functions. *J of Clinics*. 69(2) :134-144.

XVII. Widyastuti N, Dieny FF, Fitranti DY. 2016. Intake of Saturated Fat and Fiber in Obese Adolescents in Relation to Metabolic Syndrome. Indonesian Journal of Clinical Nutrition. 2016;12(4):131–66.

XVIII. Yekti, N., Rochmah, Y.S. and Mujayanto, R., 2014. Profile analysis of c-reactive protein levels in the periodontal health status of type 2 diabetes mellitus patients (Study at the Sultan Agung Islamic Hospital in Semarang).*ODONTO: Dental Journal*, *1*(2), pp.19-24