

ISBN : 978-979-18458-5-4

PROCEEDING

**INTERNATIONAL CONFERENCE ON DRUG
DEVELOPMENT OF NATURAL RESOURCES**

*Jambuluwuk Malioboro Boutique Hotel
June 30th, 2012*

**THE INTERNATIONAL CONFERENCE ON DRUG
DEVELOPMENT FROM NATURAL RESOURCES
YOGYAKARTA, INDONESIA, 2012**

Editors :

Iis Wahyuningsih

Wahyu Widyaningsih

Nanik Sulistyani

Dwi Utami

Published by :

Faculty of Pharmacy, Ahmad Dahlan University
Jln. Prof. Dr. Soepomo, Warungboto, Yogyakarta
Indonesia

ORGANIZING COMMITTEE

STEERING COMMITTEE

Dra. Any Guntarti, M.Si, Apt (Ahmad Dahlan University, Yogyakarta)

Prof. Xiao Qiang (Guangxi University, China)

Prof. Dr.Masnah (University Putra Malaysia, Malaysia)

**Tri Lestari Handayani, M.Ked, Sp. Mat
(Muhammadiyah Malang University, Malang)**

Chairman

Dr. Nurkhasanah, M.Si, Apt

Secretary

Kusmiyati, S.Si, M.Sc

Scientific committee

Prof. Ling Jianghong (Guangxi University, China)

Prof. Dr. Maznah Ismail (UPM, Malaysia)

Prof. Dr. Achmad Mursyidi, M.Sc, Apt

Dr.rer.nat Endang Darmawan, M.Si, Apt

Dr. Dyah Aryani Perwitasari, Ph.D, M.Si, Apt

Dr. Nurkhasanah, M.Si, Apt

CONTENS

Editors	i
Steering Comitte	iii
Preface From Editor	v
Welcome Speech From Comitte	vii
Preface From Dean Ahmad Dahlan University	ix
Preface From Dean Guangxi University	xi
Contens	xiii
New Trend in Traditional Chinese Medicine	1
<i>Ling Jiang Hong</i>	
Experiences of Herbs Medicine Aplication in Clinical Practice	3-5
<i>Nyoman Kertia</i>	
Development of Antiallergy from Natural Product	7-9
<i>Zulies Ikawati</i>	
Using Nanoparticle As Drug Delivery System Carrier: a Case Study of Chitosan Nanoparticle	11
<i>Etik Mardiaty</i>	
Rapid Test In Clinical Pharmacology Activity Using Ftir Spectroscopy	13-16
<i>E.Darmawan, A. Fernandes, R. Muelle, S.L. Hass, J. Backhaus</i>	
Critical Problem in Halalness of Pharmceutical Preparations	17-23
<i>Achmad Mursyidi</i>	
Anti Cancer Pre-Screening For Several Plant Using Brine Shrimp Lethality Test	25-29
<i>Chasanah U., H. Rachmawati, V Febriana, F.T. Wulandari, S.B. Sikdewa, R. Amalia, A.S. Debby, A.S. Jamil</i>	
Anticancer Activity of Curcuma Domesticae Rhizome Extract Against Dmba-Induced Colon Cancer on Mice	31-38
<i>Annisa Farida Muti, Sukardiman and Abdul Rahman</i>	
Antibacterial Activity Of Binahong Rhizome Ethanol Extract (Anrederacordifolia(Tenore) Steen) Against Salmonella Typhi	39-48
<i>Nanik Sulistyani, Msy. Rachmawati Nurul Utami</i>	

Protective Effect of Turmeric (<i>Curcuma Longa</i>) Ethanol Extract to Cataract Occurrence on Rat Induced By Sodium Selenite	49-53
<i>Sapto Yuliani, Annis Widyastuti</i>	
The Analgesic Effect of <i>Curcuma Xanthorrhiza Roxb</i> and <i>Curcuma domestica Val</i>: Analysis of The Ethanol Extract in Mice With Writhing Test	55-60
<i>Lilik Yusetyani, Herra Studiawan, Reni Sulistyawati</i>	
Adenin From The Leaves of Binahong (<i>Anredera cordifolia</i> (Ten) Steenis)	61-65
<i>Ratna Djamil, Wahyudi PS, Wahono S, M.Hanafti</i>	
Anticonvulsant Activity of Ethanol and Chloroform Extract of <i>Centella Asiatica</i> (L) Urb on Pentylenetetrazole Induced Seizure In Mice	67-71
<i>Moch.Saiful Bachri, Fitri Setyaningsih, Nita Dwi kurniawati</i>	
The Influence of Copper And Cobalt Ions Addition In Cell Suspension Culture Of <i>Impatiens balsamina</i> L. Toward Coumarins Yield	73-78
<i>Zainab, Soegihardjo C.J.</i>	
Eurycomanone Induces Apoptosis Through Activation of Caspase-9 on Human Cervical Cancer (Hela) Cells	79-84
<i>Nurkhasanah, Azimahtol Hawariah, LP</i>	
Antiangiogenic Effects of Water Fraction of Green Algae (<i>Spirogyra</i> sp.) Ethanol Extract With Chorio Allantoic Membrane Method	85-93
<i>Ketty Suryaningrum. Wahyu Widyaningsih</i>	
Cytotoxic and Apoptosis Inducing Activity of Ethanol And Ethyl Acetate Extracts of Binahong Leaves (<i>Anredera Cordofolia</i> Tenore Steen) on Cervical Cancer Cell Lines (HeLa)	95-101
<i>Dwi Utami, Vivi Januarti, Melly</i>	
Isolation And Larvacidal Activity of Essential Oil Mango Turmeric Rhizomes (<i>Curcuma Mangga</i>, Val.) Against Larvae of <i>Aedes Aegypti</i> Mosquitoes Also Gas Chromatogram-Mass Spectrometry Profile	103-109
<i>Lolita, R. Siti Nur Djannah, Laela Hayu Nurani</i>	
Ethanolic Extract of Pasak Bumi Leaves Antiangiogenic Activity on Chorioallantoic Membrane of Chicken Embryo Induced by bFGF	111-117
<i>Nina Salamah</i>	
Activities of Red Meniran Ethanol Extract (<i>Phyllanthus urinaria</i> L.) AS Antihyperuricemia on Mice	119-127
<i>Aguslina Kirtishanti</i>	

- Antimicrobial Activity of Ketapang Leaves (*Terminalia cattapa* L.) on Gills Disease of Mujair Fish (*Oreochromis mossambicus*)** 129-132
Syarmalina and Anisya Putri Mayang Sari
- Chemical Constituents of Ethyl Acetate Fraction From The Methanol Extract of *Typhonium Flagelliforme* Leaves, Araceae.** 133-138
Yunahara Farida, Wahyudi P.S, Wahono S., M.Hanafi
- In Silico Study on Estrogenic Effect of Bioactive Compounds of *Trigonella Foenum-Graecum* L. and Activity on T47D Cell Line** 139-146
Kurnia Agustini, Harry Noviardi, Firdayani
- Bioactivity Brine Shrimp Lethality Test Extract And Fractination From *Kalanchoe Pinnata* Lam Pers** 147-151
Megawati, Ahmad Darmawan, Indah dwiatmi dewijanti
- Diabetes Mellitus: Biochemistry, Clinical Correlation, and Development of Synthetic Hypoglycemic Agent** 153-159
Mulyadi
- Extraction Of Cellulose and Preparation of Nanocellulose From Palm Empty Fruit Bunches Fibers** 161-166
Adriana, Basuki Wirjosentono, Thamrin, Saharman Gea, Ramzi Jalal, Eka Nuryanto
- The Effect of Mixing Temperature And Mixing Time on The Physical Properties and Stability of Green Tea Extract Emulgel** 167-173
Agatha Budi Susiana Lestari
- Formulation Chewable Tablets Ethanol Extract of Aloe Vera (*Aloe vera* L.) With The Combination of Excipient Avicel Ph 102- Maltodextrin** 175-182
Dito Galih Prasetyo, Arif Budi Setianto, Azis Ikhsanudin
- Temugiring (*Curcuma heyneana*) : An Antioxidant in *Pupur Dingin* As a Traditional sunscreen From Borneo** 183-188
Wisnu Agitidarria, Lisna Andriani, Annisa Farida Muti
- The Influence of Pre-Treatment and Co-Treatment of Ambon Banana Fruit Juice to Furosemide Bioavailability** 189-194
Iis Wahyuningsih, Ekadhitya Utamy, Annas Binarjo
- The Effect of Propylene Glycol Concentration on The Physical Characteristic and Release Rate of Caffeine In Gel** 195-199
Endang Diyah Ikasari, Milani

The Influence of Propylene Glycol Pre-Treatment to Transport of Epigallocatechin Gallat In Green Tea (<i>Camellia sinensis</i>, L) Extract Across Mice Skin, In Vitro	201-204
<i>Nining Sugihartini</i>	
Formulation of Lozenges Made From Carrot Extract (<i>Daucus carota</i> Linn) Presented In 1st International Conference on Drug Development From Natural Resources	205-212
<i>Evi Amelia Sari, Amalia Rochmawati, Iklim Aisyawatia), Uswatun Chasanah, Ahmad Radjaram</i>	
Synthesis of A Potential Anti-Cancer Inhibitor Compound: Metil 2-Cinnamamido-3-Hydroxy Propanoate	213-216
<i>Teni Ernawati, Dila Fairusi, Minarti, PuspaDewi Lotulung, Muhammad Hanafi</i>	
Synthesis of Lactone Compound As a Candidate Anti-Canceragent: 4-Phenylchroman-2- One Using Acid Catalyst	217-221
<i>Teni Ernawati, Dila Fairusi, Minarti, PuspaDewi Lotulung, Muhammad Hanafi</i>	
Bioactive Constituents From <i>Andrographis paniculata</i> Ness With Hepatoprotective Potentials Through <i>in silico</i> Method	223-227
<i>Firdayani and Bambang Srijanto</i>	
Heavy Metals Accumulation of <i>Stevia Rebaudiana</i> From Leaves and Flowers Extraction	229-236
<i>Erna Wati Ibnu Hajar, A.M. Mimi Sakinah, Ahmad Ziad Sulaiman</i>	
Analysis of Rhodamin B in Ground Red Chili Using Thin Layer Chromatography-Densitometry	237-243
<i>Diana Serlahwaty, Anissa Ayu Ningsih</i>	
Synthesis of 4-Chlorobenzoylthiourea From 4-Chlorobenzoil Chloride and Thiourea With Different Heating Time and Temperature	245-253
<i>Dini Kesuma</i>	
Antioxidant Activities and Screening Bioactivities From Extract of <i>Koordersiodendronpinnatum</i> Merr. (<i>Anacardiaceae</i>) Leaves	255-260
<i>Megawati, Sofa Fajriah, Salahuddin</i>	
Determination of Active Substances in Torbangun Plant (<i>Coleus Amboinicus</i> Lour) By Using Gas Chromatography-Mass Spectrophotography (GC- MS) And Potential Component Analysis (PCA) For Increasing Women Milk Production	261-268
<i>Awalludin Risch, A.M. Mimi Sakinah and Sri Murni Astuti</i>	
In Vitro Antioxidant Activity of Lampes (<i>Ocimum Sanctum</i>) Leaves and Seeds Ethanol Extract Using DPPH Method	269-273
<i>Hari Susanti</i>	

The Effectivity of Piracetam and Citicolin Among Inpatient Head Injury With Glasgow Coma Scale (GCS) At PKU Muhammadiyah Yogyakarta Hospital	275-280
<i>Nailis Syifa', Zullies Ikawati, Inayati</i>	
The Effect of Chromotherapy For Reducing Levels of Hallucinations In Patients With Impaired Sensory Perception: Hallucination in RS. Prof.Dr Soeroyo Magelang	281-286
<i>Heni S.E.R, Retna T.A.</i>	
The Knowledge of Medical Students At System Problem Based Learning (PBL) About Use of Natural Resources In Medicine	287-290
<i>Elly Usman, Yusticia Katar</i>	
Evaluation of Antihypertension Medicine Used in Patients of PKU Muhammadiyah Hospital Yogyakarta January – Mei 2011 Period	291-295
<i>Semivientri, Woro Supadmi</i>	
Implementation of Waiting Time of Pharmacy Service For Outpatients At Pharmacy Installation of Jogja Hospital	297-301
<i>Faridah Baroroh, Lukman Hakim, Endang Sulistyani</i>	
Customer Satisfaction Is The Drug Information Service Self Medication (Several studies pharmacy in regional Malang)	303-309
<i>Heru Prabowo Hadi, Asri Julia Sukmaningrum, Rizal Affandi, M. Suhud, Nining Swatiningsih, Hidajah Rachmawati, Liza Pristianty</i>	
Willingness To Be Involved In Tobacco Smoking Cessation Program: A Survey of Pharmacy Student At Universitas Islam Indonesia	311-315
<i>Saepudin</i>	
Formulation and Characterization of Ascorbic Acid Nanoparticle With Chitosan As a Carrier For Topical Administration	317-323
<i>Nuri Ari Efiana</i>	
The Influence Of Storage Patterns On The Stability Of Paracetamol Syrup Concentration	325-329
<i>Engrid Juni Astuti Dian Ermawati, Harjana, Achmad Inoni, Fitratunikmah</i>	
The Triterpenoid Saponin From Binahong [<i>Anredera cordifolia</i> (Ten) Steenis] oo Potential Using As Antidiabetic Activity in Animal Laboratory	331-343
<i>Sri Murni Astuti, A. M. Mimi Sakinah, Awalludin Risch</i>	
Formulation of Mannitol Based Pegagan (<i>Centella asiatica L.</i>) Extract Lozenges (The Impact of HPMC 2910 3CPS as binding agent to Tablet Physical Charateristics)	345-350
<i>Dian Ermawati1, Achmad Inoni, Bambang Widajaja, Saschita</i>	

The Standardization of Ethanol-Water Extracts of *Kayu Angin* Plants (*Usnea flexuosa*, Tayl) From Three Growing Places

Mumpuni E, Sudjaswadi W, Sureni E. Melania, Layla G.

THE INFLUENCE OF PRE-TREATMENT AND CO-TREATMENT OF AMBON BANANA FRUIT JUICE TO FUROSEMIDE BIOAVAILABILITY

Iis Wahyuningsih, Ekadhitya Utamy, Annas Binarjo

Faculty Pharmacy, Ahmad Dahlan University
avinagil@gmail.com

Abstract

Background. Some patients used banana to administered tablet or pill . It is possible that there will be pharmaceutical interaction between the drug and banana. This study was aimed to know the influence of pre-treatment and co-treatment of ambon banana fruit juice (*Musa paradisiaca L.*) on the furosemide bioavailability..

Method. This study was carried out using cross over design.. The subjects used in this study were five local male rabbit with same in body weight and divided into 4 treatments. The A group was treated by furosemide 80 mg (control), The B group was treated by ambon banana fruit juice 100% (5 ml) 2 hours before furosemide administration. The C and D groups were treated by ambon banana fruit juice 100% and 50% (5 ml) in the same time with furosemide administration. The blood was taken through marginalis vein of ears at the time 0,5; 0,75; 1; 1,5; 2; 3; 3,5; 4; 8; and 24 hours after furosemide administration. Furosemide in the blood was determined using Kelly's method modified by Hakim. Then, the bioavailability parameters were measured from pharmacokinetics profiles . Furthermore, t_{max} and C_p_{max} were analized using one-way Anova while AUC₀₋₈ was analized using Kruskal-wallis.

Result. The average of furosemide bioavailability in male rabbit are C_{pmax} ; 15,21.10⁻² (ìg/ml), 13,97.10⁻² (ìg/ml), 11,08.10⁻² (ìg/ml), 12,10.10⁻² (ìg/ml), t_{max} ; 2,30 hours, 3,50 hours, 3,35 hours , 5,30 hours, and AUC₀₋₈ ; 10,53 ìg.ml⁻¹ hour, 4,00 ìg.ml⁻¹ hour, 4,95 ìg.ml⁻¹ hour, 3,37 ìg.ml⁻¹ hour respectively for treatment A,B,C, and D. There were no significant differences of t_{max} and C_{pmax} and AUC₀₋₈ among groups (p value > 0.05).

Conclusion. There were no influence of pre-treatment and co-treatment of ambon banana fruit juice (*Musa paradisiaca L.*) on the furosemide bioavailability.

Key word : Furosemide, Ambon Banana fruit Juice (*Musa paradisiaca L.*), Bioavailability

INTRODUCTION

Peroral administration is the most natural administration of the medicines. Most of the peroral dosage forms such as tablets, capsules, pills, should be swallowed with water. However, some patients can not take their per oral medication without bananas. This could be caused by the physical properties of the banana fruit is soft and pliant so that it can help patients in swallowing the medicine. The use of bananas along with the drug is not only found in homes, but also at the hospital. Patients who need banana to take the medicines generally those who are elderly, children and patients who have difficulty swallowing medication with water. The habit of medicine administration along with banana could be a problem, because the presence of food-drug interactions. We could not understand the abnormalities or changes of our body, because of the the light effects of drug-food interaction. However, people consider banana in this issue because it was easy to obtain, the price is also accessible by the whole society (Handayani,2009).

The prevalence of hypertension in Indonesia reached 31.7% of the population at the age of 18 years and over 60% of them were ended in stroke. While the rest were ended by heart, kidney failure and blindness. According to Joint National Committee (JNC) 7, the first line therapy for hypertension is a diuretic, one furosemida. The Biopharmaceutics Drug Classification System (BCS) categorizes furosemida as class II, due to low solubility, furthermore furosemida also has a 95% protein binding (McEvoy, 2002), thus furosemide is potential for interacting with other agents.

According to the premise that people often take the medicine with a green banana, including furosemide allows the interaction between them. Theoretically, consumption of bananas along with the favorable interaction furosemide is because bananas contain lots of potassium (Anonymous, 2002), whereas a loop diuretic is likely causes hypokalemia. The

co-administration with banana juice could be expected to affect the bioavailability of the furosemide tablet. The aim of this study was to evaluate the effect of pre-treatment and co-treatment of ambon banana fruit juice (*Musa paradisiaca* L.) on the furosemide bioavailability.

METHODS

The instruments used in this study were: glass tools, scapel, micro pipettes, syringes, vortex (Thermolyne 37 600), centrifuge equipment (centrifuges) Mettler Toledo AG 285, spectrofluorometer (Hitachi F 2500) and analytical balance (CEN Phoenix 91 501).

The materials used were obtained from the ambon banana one supermarket in the city of Yogyakarta. The chemicals used were of pharmaceutical furosemide degrees (Indofarma), ethyl acetate pa (E Merck), HCl pa (E Merck), phosphate buffer pH 8, NaOH pa, heparin, distilled water (Lab Asia) and the local strain male rabbits aged 3 months with the same weight.

Identification and Preparation of Ambon Banana Fruit Juice

Identification of plant was performed at the Laboratory of Biology, University Ahmad Dahlan. Identification was done in an organoleptic, based on physical characteristics, odor, color and distinctive flavor of banana fruit. Banana juice was made by weighing 50 g of bananas and water to 50 ml. The concentration of 50% w / v was obtained by the dilution of 100% w / v.

Bioavailability Furosemida Parameter Determination in Blood

The five same weight of local strain male rabbits were examined using Cross Over design with 4 treatments (Table I).

Table I. Cross over the design and treatment with banana juice on the bioavailability of the furosemide tablet

Rabbits	Week			
	I	II	III	IV
1	A	B	C	D
2	B	C	D	C
3	C	D	A	B
4	D	A	B	A
5	A	B	C	D

A = 80 mg tablet furosemide (control), B = Pretreatment of 100% w / v banana juice 2 h before the furosemida tablet, C = Co-treatment of 100% w / v banana juice with a furosemida tablet, D = Co-treatment of 50% w / v banana juice with a furosemide tablet, The total volume of solution was 5 ml

Before the treatment, the rabbits were fasted for one day. We consider 7 days for washing out in each treatment. After the drug administration, the blood was taken at hours 0.5, 0.75, 1, 1.5, 2; 2.5; 3; 4; 8 and 24, through the vena marginalis rabbit ears. The blood as collected in tubes with heparin ependrof.

Determination of the furosemida bioavailability

The bioavailability parameters included in this study were C_p max, t max and AUC 0-8 which were obtained directly from the relationship curve between drug concentration and time, and AUC 0-8 was obtained by the trapezoidal method.

Data Analysis

Data were analyzed statistically with tests of homogeneity of variance and data normality. After considering the homogeneity of variance and data normality the differences between the treatments were analyzed using or Kruskal Wallis test.

RESULTS AND DISCUSSION

This study showed that there were no influence of pre-treatment and co-treatment of ambon banana fruit juice (*Musa paradisiaca* L.) on the furosemide bioavailability.



Figure 1. Ambon banana fruit

The ambon banana used in this study was white when ripe yellow discharge. Its skin was smooth and would change the color into yellow when ripe at room temperature. Taste slightly sour was sweet and strong odor. These bananas have an average length of 15-20 cm and a diameter of 3.5 to 4 cm (Anonymous, 2010). The banana is creamy colored, fragrant and sweet (Anonymous, 2011).

From the determination of the excitation and emission wavelengths in the blood plasma, furosemide was consecuted at 272 nm and 404 nm, whereas the linear regression equation for the standard curve was: $Y = 0.247 + 4.767 x$; $r = 0.996$.

Recovery requirements analysis method that is between 80-120% of the levels was listed

in the table (FDA requirements) (Pusporini, 2006). The recovery ranges from 89.96 to

Next, the bioavailability of furosemide tablet on male rabbits are shown in Table III.

Table II. Furosemide levels in blood plasma vs time (mean ± SE) on treatment with banana juice

Time (hours)	C(µg/ml)			
	A mean±SE (10 ₋₂)	B mean±SE (10 ₋₂)	C mean±SE (10 ₋₂)	D mean±SE (10 ₋₂)
0	0	0	0	0
0,5	4,70 ± 0,88	4,01 ± 0,48	5,53 ± 0,66	6,44 ± 2,13
0,75	5,06 ± 0,83	4,39 ± 1,23	5,49 ± 1,68	5,18 ± 1,25
1	8,03 ± 2,41	4,18 ± 1,04	4,11 ± 0,71	6,81 ± 2,15
1,5	10,14 ± 5,52	7,35 ± 2,33	4,73 ± 1,20	9,34 ± 2,01
2	12,69 ± 5,04	10,78 ± 3,43	5,79 ± 1,48	6,07 ± 1,08
2,5	9,57 ± 2,09	6,23 ± 2,17	6,72 ± 1,95	8,07 ± 1,81
3	8,27 ± 1,32	9,88 ± 1,46	7,27 ± 2,37	11,12 ± 2,43
4	8,14 ± 1,46	8,14 ± 2,00	10,61 ± 2,51	8,94 ± 2,08
8	6,31 ± 1,34	7,83 ± 2,35	8,61 ± 2,68	9,06 ± 2,30
24	5,69 ± 0,93	5,15 ± 1,36	6,19 ± 1,44	4,31 ± 1,49

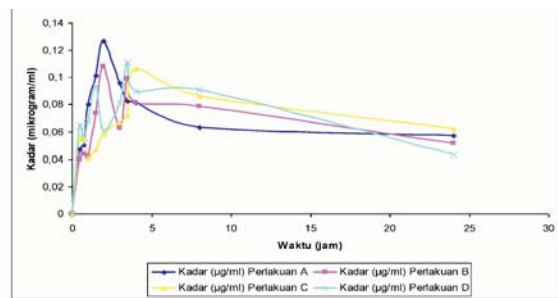


Figure 2. Curve levels furosemide (mean ± SE) in plasma vs time. The 80 mg of furosemide tablet was given orally

107.28% indicated that the method chosen has accurate range of % recovery (% recovery). The smallest percent degradation of furosemide was found when it was stored at -20 ° (freezer), thus, the sample should be directly extracted the plasma stored in the freezer.

Table II and Figure 3 are presented the furosemide concentration in blood plasma.

After the calculation, the obtained parameters such as bioavailability of the furosemide tablet are presented in table III

There were no significant differences in bioavailability parameters among 4 treatments.

The results showed that the bioavailability parameter in each treatment produced no significant differences (p> 0.05) both at AUC, t max and Cp max. This means that treatment the banana juice did not influence furosemide bioavailability significantly. There was also no significant differences of furosemide bioavailability in the co-treatment of 5 ml banana juice at a concentration of 50% w / v to 100% w / v with furosemide tablet. There were no significant differences of tmax and Cpmax and AUC0-8 among groups (p value> 0.05).

The results are consistent with the study performed by Kelly et al (1974) and Hammurland et al (1982) which stated that furosemide provided with food did not affect the bioavailability of the drug, although

Table III. The mean parameter furosemide tablet bioavailability in banana juice treatment

Parameters	Treatment			
	A	B	C	D
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE
C _p _{max} (µg/ml)	15,21 ± 4,67	13,97 ± 2,62	11,08 ± 2,51	12,10 ± 2,24
t _{max} (Jam)	2,30 ± 0,62	3,50 ± 1,16	3,35 ± 0,65	5,30 ± 1,10
AUC ^{0-∞} (µg/ml. hours)	10,53 ± 5,67	4,00 ± 1,15	4,95 ± 1,08	3,37 ± 1,29

Hammurland et al found that the peak levels decreased and the study of food provided is not mentioned specifically. These results were in contrast to the results obtained by Beermann (1986) which stated that food may decrease the bioavailability of furosemide about 30%, but the decreased bioavailability due to the diuretic effect furosemide not because of the interaction with food intake. The research was conducted on healthy humans with food such as milk, cheese, egg, avocado and fish juice. According McCrandle, et al (1996) furosemida 40 mg supplied with food (orange juice, eggs, milk and butter) were also significantly reduce the bioavailability of 30% but decreased bioavailability of the mechanism is not described further. This study has limitations in the sensitivities analysis methods are used, so for further research are expected to use more sensitive analytical methods, eg HPLC.

CONCLUSION

1. Pre-treatment of banana juice did not affect the bioavailability of the tablet furosemide parameters ($p > 0.05$).
2. There weres no significant difference of furosemide bioavailability in the effect of 5 ml banana juice co treatment at a concentration of 50% w / v to 100% w / v.
3. There was no significant difference in the effect of giving 5 ml banana juice 100% w / v simultaneously or two hours prior to the furosemide bioavailability

REFERENCE

- Anonim, 2002, *AHFS Drug Information, Book 5*, 2566-2570, American Society of Health-System Pharmacists, USA.
- Beermann, B., Midskow, C., 1986, Reduce Bioavailability and Effect of Furosemide Given with Food, *J Clin.Pharmacol*, 29:725-727
- Chobanian, A.V., Bakris, G.L., BLACK, H.R., Green, L,A., dan Joseph, L.L., 2003, The Sevent Report of Joint National Commetee VII on Prevention, Detection, Evaluation, and Treatment of Hight Blood Preasure, <http://www.jasa-ama-assn.org/cgi/content/full/289.19.256> Vi, accessed on 16 April 2008
- Hakim, L., 1996, Ekskresi Urin Furosemida pada Kelinci setelah Praperlakuan dengan bunga kubis, *Laporan penelitian*, Universitas Gadjah Mada, Yogyakarta.
- Hammurlund, MM., Paalzow LK., Odland B., Pharmacokinetics of Furosemide in man after intravenous and oral administration, Application of moment analysis, *Clin.Pharmacol. Ther.*, 1983;25:197-207.
- Jehan, N., 2005, Uji Efek Infusa Daun Teh (*Camelia sinensis* (L.) O.K. folium) pada Tikus Putih Jantan Galur Wistar, *skripsi*, Fakultas Farmasi Universitas Ahmad Dahlan, Yogyakarta.
- Kelly, M.R., Cutler, R.E, Forrey, A.W., and Kimpel, B.M., 1974, Pharmacokinetics of

- orally Administered Furosemid, *J Clin.Pharmacol. Ther.*, 15:178-186.
- Mayershon, M., 1996, in Prinsiples of Drug Absorption in: Banker, G.S., and Rhodes, C.T., (Ed.), *Modern Pharmaceutics*, 3th ed, 122-125, Marcel Dekker Inc., New York,
- McCrandle, J.L., Li kam wa, T.C., Barron, W., Prescott, L.F., 1996, Effect of food on the Absorption of Frusemide and Bumentanide in Man, *J Clin.Pharmacol*, 42:743-746
- Mutschler, E., 1991, *Dinamika Obat*, diterjemahkan oleh Mathilda, B.W, dan Anna, S.R., 5th ed, 9-12, 93, 572, Penerbit ITB, Bandung.
- Shargel, L, Wu-Pong., and Yu, A.B.C., 2005, *Applied Biopharmaceutics and Pharmacokinetics*, 5th Edition, 375-382, 453, 457-458, 460-461, The McGraw-Hill Companies, Inc, Singapore.