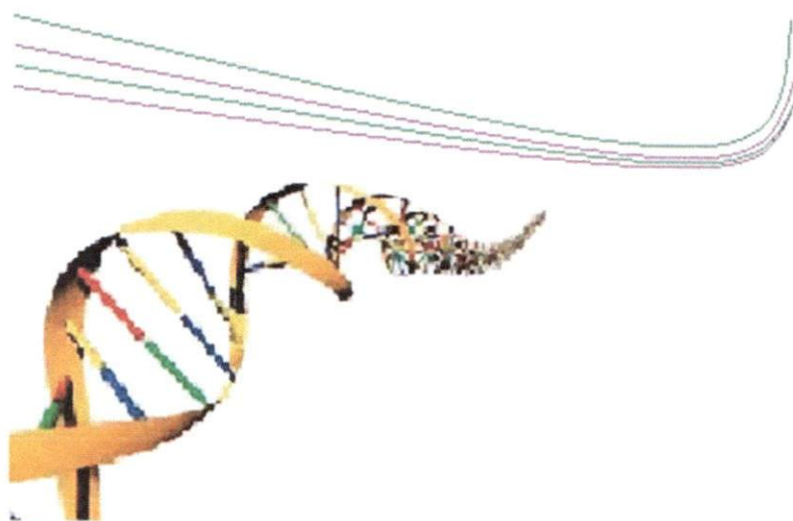




International Journal of Pharma
Research and Health Sciences



Pharma Health Sciences

www.pharmahealthsciences.net



Home Aim & Scope Editorial Board Instruction To Author Submit Manuscript Current Issue ▼ Contact Us Indexing



International Journal of Pharma Research and Health Sciences

eISSN : 2348-6465

<<< Latest News: Abstracting in International databases >>>

Projected impact factor-0.039 (As per Google Scholar Citation), DOI: 10.21276/ijprhs, ICV Value: 86.18 (2015), 55.26 (2014) and 5.13 (2013), Abstracting in CAS Data



International Journal of Pharma Research and Health Sciences (IJPRHS)

(An open access, Indexed, Peer- Review Online Pharmaceutical and Health Research Journal)

Language: English

ISSN: 2348-6465

Frequency: Bimonthly

Projected Impact Factor: 0.039 for 2017 (Based on Google scholar citation)

Editor In Chief: Dr Satyabrata Bhanja

Abstracted and Indexed: Chemical abstract services (CASSI), NLM (NCBI, USA), GENAMICS, Google scholar, Electronic Journals Library, Scientific Indexing Services, Open J Gate, Ulrichs Periodical.

DOI: 10.21276/ijprhs

Journal Policy

- » Open Access Policy
- » Peer Review Policy
- » Copyright
- » Antiplagiarism Policy

Editorial and Publication Ethics

- » Journal privacy policy
- » Responsibility of Publisher
- » Responsibility of Editor
- » Reviewer Responsibility
- » Responsibility of author

Quick Links

- » Home
- » Editorial Board
- » Current Issue
- » Submit Manuscript
- » Indexing
- » Best Paper Award
- » Most Cited Article
- » Join Editorial/Reviewer

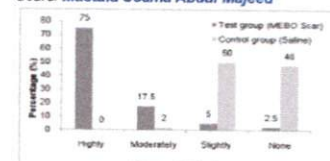
ICV Value= 86.18 (2015), 55.26 (2014), 5.13 (2013)

Instruction to Authors

Copyright Agreement

Most Downloaded

1. The Use of MEBO Scar Ointment in the Treatment and Prevention of Post-Operative Wound Scars. **Mustafa Usama Abdul Majeed**

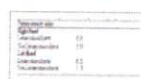


057595

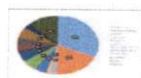
DOI Prefix: 10.21276/ijprhs

IJPRHS is an International peer review English bimonthly online open access journal. The focus of the journal is to publish high standard double blinded peer reviewed original articles, review articles, short communications and case study in pharmaceutical and multidisciplinary health sciences. The journal allows free unlimited access (Open Access) to its contents and permits authors, industrialists, academicians and researchers to self-archive the published articles. IJPRHS hopes to be the leading platform for sharing outstanding research and knowledge with aim to encourage and empower young and budding professionals, students and scientist in our society.

Current Issue: Volume-7, Issue-2, 2019.



Dermatoglyphic Digital Patterns and Pattern Intensity Index in Uterine Leiomyoma



Biotechnological Drugs Found in Pharmacies in Turkey



Quality Control Parameters of Herbo Mineral Formulation: Sarivadi vati



Assessment of 1, 3, 4- Oxadiazole Derivatives for Memory Enhancing Activity



Toxicity Study on Siddha Formulation Appalakra chooranam in Albino Rat



Safety and Efficacy Study of ZyoricaTM Tablet (Carica papaya Leaf Extract) for Thrombocytopenia Associated with Dengue Fever: A Randomized Double Blind Placebo Controlled Trial.

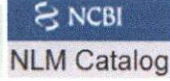
More >>

Articles are Invited for publication below mentioned subjects

- » Pharmaceutics
- » Industrial Pharmacy
- » Pharmaceutical Technology
- » Medicinal Chemistry
- » Pharmacology
- » Pharmacognosy
- » Biopharmaceutics
- » Pharmacy Practice
- » Advanced Drug Delivery System
- » Computer Aided Drug Design
- » Medicinal Microbiology
- » Medical Biotechnology
- » Virology and Pathology
- » Toxicology and Radiology
- » Pharmaceutical and Immunology
- » Medicinal Biochemistry
- » Analytical and Biopharm Chemistry
- » Medicinal and Organic Chemistry
- » Molecular Biology
- » Pharmaceutical Analysis

"Dear authors ! For Improving Citing in reputed databases, formatting the references for the manuscript must be Vancouver style

!!The Articles published are under strict anti-plagiarism Policy!!



Open access policy | Editorial and Publication Ethics

© International Journal of Pharma Research and Health Sciences: Published by PHS Scientific House.

Online since October 2013





Home Aim & Scope Editorial Board Instruction To Author Submit Manuscript Current Issue ▼ Contact Us Indexing

EDITORIAL BOARD

EDITOR IN CHIEF

Prof (Dr) Satyabrata Bhanja M Pharm, PhD
 Professor, Division of Pharmaceutics
 Malla Reddy College of Pharmacy, Doolapally Road, Near Forest
 Academy, Dulapally, Kompally
 Affiliated to Osmania University, Hyderabad, Telangana State,
 500014, India
 Email: chiefeditorjprhs@gmail.com /
 satyabrata_bhanja@rediffmail.com

ASSOCIATE EDITORS

Prof (Dr) P Ellaiah M.Pharm, PhD
 Retd. Professor and Principal, College of pharma.
 sciences, Andhra University,
 Director, Jeypore College of Pharmacy, India.
 Email: pharmajeypore@yahoo.co.in

Dr Sisir Nandi, M Pharm, PhD (IICB)
Former European Union Marie Curie Post Doc. Fellow, Slovenia
 Global institute of pharmaceutical education and research, Kashipur,
 Affiliated to Uttarakhand technical university,
 Uttrakhand, India.
 Email: sisir.iicb@gmail.com

Dr Naresh Kumar Sahoo PhD (IIT)
 Department of Chemistry
 SOA University, Odisha, India.
 Email: nareshsahoo@soauniversity.ac.in

Dr Bhabani Shankar Nayak M.Pharm, PhD
 Associate Professor, Institute of Pharmacy and Technology, Salipur
 Odisha, India.
 Email: bhabani143@yahoo.co.in / jpar.editor@jparonline.com

EDITORIAL BOARD MEMBERS

Dr Sitansu Sekhar Nanda, M.Pharm, PhD
 Dept of Ph Chemistry,
 Myongji University, Seoul,
 South Korea.
 Email: sitansu@mjju.ac.kr

Dr Amarjeet D Patil, PhD
 Senior Clinical Fellow, Trafford General Hospital
 Manchester Royal Infirmary and St Mary's Hospital
 Central Manchester University Hospitals Foundation Trust
 Manchester, United Kingdom.
 Email: Amarjeet.Patil@crft.nhs.uk

Prof (Dr) SSA Lucia Grumetto, PhD
 Dipartimento di Farmacia
 Università degli Studi di Napoli Federico II
 Via D. Montesano, 49
 I- 80131 - Napoli, Italy.
 Email: grumetto@unina.it

Dr M C Bagchi, PhD
 Emeritus Scientist, School of Biosciences and
 Engineering, Jadavpur University
 Kolkata, India.
 Email: mcbagchi@iicb.res.in

Prof (Dr) Arnaud Philippe, PhD
 Faculty of Pharmacy, Pharmaceutical Technology
 Unité de Technologies Chimiques et Biologiques pour la santé
 Paris, France.
 Email: pharmaud76@gmail.com

Dr RSK Vijayan, PhD
 Center for Biophysics and Computational biology, Dept of Chemistry,
 Temple university Philadelphia, PA 19122 USA.
 Email: biovijayan@gmail.com

Dr Bhavik J. Bhatt, PhD
 Principal Pharmaceutical Technology Specialist
 Manufacturing Science & Technology
 Teva Pharmaceutical Industries, Florida, USA.
 Email: bhavikjbhatt@gmail.com

Dr Shashank Jain PhD
 Research Scientist, G & W Labs
 New Jersey, USA.
 Email: shashank52@gmail.com

Dr Marzia Cirri, PhD
 Dept. Chemistry, School of Human Health Sciences,
 Univ. Florence, Via Ugo Schiff 6
 50019 Sesto Fiorentino (FI), Italy.
 Email: marzia.cirri@unifi.it

Dr A P Attanayake, PhD
 Faculty of Medicine
 University of Ruhuna
 Sri Lanka.
 Email: anoja715@yahoo.com

Dr Niket Patel, PhD

Sr. Formulation Scientist at Charles River Laboratories,
(Former QS Pharma)
Marcus Hook, Pennsylvania, USA.
Email: nbpatel003@gmail.com

Dr Indrani Bera, PhD

Department of Chemical and Biomolecular Engineering
University of Maryland,
College Park, USA.
Email: iberam@umd.edu

ASSISTANT EDITORIAL BOARD MEMBERS

Dr Narendra Kumar, Amity University, India.

Dr Sudhanu Sahu, BHMS, Odisha, India.

Dr A Rajendra Prasad, India

Dr Rahul Kr Raj, IMED Gloabl, India.

Dr K Madhava Chetty, SV University, India.

Mr Mohammad Ali Shariati, Iran.

Dr K V Madhusudhan, India.

Dr Natanamurugraj Govindan Pehang Darul Makmur, Malaysia.

Dr Jitendra Gupta, GLA University, India.

Dr Mallineni Sreekanth Kumar, India.

Dr Dnyaneshwar K Jadhav, India.

Dr Ajay Bilandi, India.

Dr Uttakar Pravin Shantaram, India.

Open access policy | Editorial and Publication Ethics

© International Journal of Pharma Research and Health Sciences: Published by PHS Scientific House.

Online since October 2013





Current Issue

VOLUME-2, (ISSUE-3) 2014

S.No.	Title & Authors Name	Pages
Review Articles		
1.	A Brief Review on Convergence of Diversifying Fields of Nanotechnology and Bioinformatics as an Advanced Revolutionized Device for Betterment of Humankind Kirti Rani [View] [Download PDF]	197-202
2.	Surgical Site Infections: Classification, Risk factors, Pathogenesis and Preventive Management Rajvir Singh, Pooja Single, Uma Chaudhary [View] [Download PDF]	203-214
Case Study		
3.	A Rare Case Report of Carcinoma Esophagus in Young Adult Athwale Kedar, Lakhkar Dilip, Katariya Mitesh, Barhate Anand [View] [Download PDF]	215-218
Original Articles		
4.	In-Vitro Study on Spasmolytic Activity of Calotropis Procera In Rabbit Jejunum Shreenivas Revankar, Jagadeesh K, Jagadeesh SC [View] [Download PDF]	219-222
5.	Development and Evaluation Sustained release matrices of Lamivudine by using Synthetic Polymer Supriya Deogire, Sonali Mahaparale [View] [Download PDF]	223-230
6.	The Peak Expiratory Flow Rates of Petrol Station Attendants in Nnewi Using a Wright Peak Flow Meter Ezejindu DN, Ujah Joseph E, Ikhaijange Happy IN [View] [Download PDF]	231-235
7.	Production of Cellulase from Micrococcus sp and effect of growth parameters Nisha P, Anitmol Das, Saritha KV [View] [Download PDF]	236-240
8.	The Influence of Sesame Oil Addition on the Arbutin Release and Penetration in Carbomer Gel Base Tristiana Erawati, Widji Soeratri, Noorma Rosita, Wida Rukmanajati, Hanifa Rahma [View] [Download PDF]	241-245
9.	Knowledge, Attitude and Practice towards Leptospirosis among municipal workers in Tiruchirapalli, India Prabhu N , Meera J , Bharanidharan G , Natarajaseenivasan K , Ismail M , Uma A [View] [Download PDF]	246-254
10.	Prevalence of Trichomonas vaginalis Infection Among Patients that Presented to Rural Tertiary Care Hospital in Tiruchirapalli, India in 2011 and 2013 Deivam S, Rajalakshmi R, Priyadharshini S, Seethalakshmi RS, Balasubramanian N, Brindha T, Lakshmi Priya P, Prabhu N [View] [Download PDF]	255-260



International Journal of Pharma Research and Health Sciences

Available online at www.pharmahealthsciences.net



Original Article

The Influence of Sesame Oil Addition on the Arbutin Release and Penetration in Carbomer Gel Base

Tristiana Erawati*, Widji Soeratri, Noorma Rosita, Wida Rukmanajati, Hanifa Rahma

Department of Pharmaceutics, Faculty of Pharmacy Airlangga University, Surabaya-Indonesia.

ARTICLE INFO

ABSTRACT

Received: 15 Jun 2014

Accepted: 29 Jun 2014

Hydrophilic arbutin as lightening agent with log P value -1.35, make it difficult to permeate through the skin and reach its site of action. Sesame oil addition (3, 5, and 7% w/w) was expected to increase the arbutin release and penetrations. The aim of this study was to investigate the influence of sesame oil addition on the arbutin release and penetrations in the Carbomer-940's gel base. The release (flux) of arbutin, as initial process before penetration, formulation were studied using cellophane membrane and buffer phosphate pH 7.0 as media at $37 \pm 0.5^\circ\text{C}$ for six hours long. The penetration of arbutin was observation on inhibition of enzyme tyrosinase activity. Inhibition percent of tyrosinase by arbutin was determined in vitro by observing the absorbance value of dopachrome (an intermediate product of melanin formation) as a reaction product between enzyme tyrosinase and L-tyrosine as a substrate using spectrophotometer. Conclusion of this study was sesame oil addition 3 and 5% w/w decreased arbutin release, sesame oil addition 3, 5 and 7% w/w increased arbutin penetrations. Increasing of arbutin effectiveness more is caused by enhancer effect of sesame oil.

Key words: Arbutin, Carbomer-940, Penetration, Release, Sesame oil, Tyrosinase-inhibition.

1. INTRODUCTION

Arbutin widely used in cosmetic as lightening agent to inhibited enzyme tyrosinase activity in basal membrane of the skin. Tyrosinase was known as enzyme that involved in melanin formation.^{1, 2} Because of the hydrophilic of arbutin with log P value 1.35 make it difficult to penetrate through the skin. To increase the

Corresponding author*

Tristiana Erawati, Department of Pharmaceutics, Faculty of Pharmacy Airlangga University, Surabaya-Indonesia. E Mail: tristiana-em@ff.unair.ac.id

was impregnated with isopropyl-myristate as modified lipid membrane. Then the preparation of arbutin gel in diffusion cell was put into the penetration chamber contain 500 ml of phosphate buffer pH 6.5 ± 0.05 at $37 \pm 0.5^\circ\text{C}$ as diffusion medium, and then the paddle was stirred 100 rpm. The sample solution around 5 ml was collected at 360 minutes after it penetrated.

2.5 Determination of enzyme tyrosinase activity

L-tyrosine solution 0.5 ml added with 3.0 ml sample solution that collected from compartment receptor after 360 minutes penetrated through Millipore membrane which was impregnated with isopropyl-myristate. The mixture was oxygenized 5 minutes then added with 1.0 ml tyrosinase solution. After incubated for 10 minutes at 25°C the mixture was inactivated with 0.5 ml TCA solution and then the absorption value measured at maximum wavelength of dophacrome.⁵

2.6 The evaluation of inhibition of enzyme tyrosinase activity

The inhibition of enzyme tyrosinase activity was performed as inhibition percent, which found from calculation of absorption value per second enzymatic reaction with inhibitor, compared with absorption value per second enzymatic reaction without inhibitor, using the following equation.⁶

$$\text{inhibition (\%)} = 100 - \frac{(A \times 100)}{B}$$

Whereas:

A = absorption value (A/second) at dophacrome λ maximum with inhibitor

B = absorption value (A/second) at dophacrome λ maximum without inhibitor

The data (inhibition %) were analyzed with ANOVA one way method ($p < 0.05$).

3. RESULTS AND DISCUSSION

The result of this study, in table 2 shows that the pH of all formulas around 6 it mean appropriate with skin pH. The spreading profile of arbutin gel preparation shows in Figure 1 and spreading-capacity of arbutin gels at 20

gram ballast shows in table 3. Spreading-capacity was formulas spreading-diameter at same ballast weight. The result of ANOVA one way test of spreading-capacity found the value of $F_{\text{calculation}} (13.741) > F_{\text{table}} (4.07)$. Its can conclude there were significant deference minimal one pair of spreading-capacity formulas data. To know which spreading-capacity formulas was significant deference it's tested by *Honestly Significant Deference* (HSD) tests. The result of HSD test in table 4, that can concluded the spreading-capacity of formula 1 did not deference with control but higher than formula 2 and 3.

Spreading-ability was the slope of linier-regression between spreading-diameter (cm) and ballast weight (gram), its shows in table 5. The slope value from its formulas was tested by ANOVA *one way method*, it's found that the value of $F_{\text{calculation}} (0.274) < F_{\text{table}} (4.07)$. So that can conclude it's was no significant deference between spreading-ability of all formulas.

Arbutin release (flux) was calculated from the linier regression of the correlation curve between square root of time versus arbutin release accumulation. Slope (flux) of linier regression showed in table 6. To make sure if there is any difference of arbutin flux between formulas was done by statistical testing using ANOVA one way. It is showed that $F_{\text{calculation}} (50,918) > F_{\text{table}} (4.07)$. From HSD result know that flux formula 1 and 2 not statistically different, but if compare with control and formula 3 were decrease. This might be caused by interaction between arbutin, sesame oil, and Tween. Tween is anionic surfactant which is amphiphil, it have affinity towards polar or non polar substance, such as arbutin and sesame oil. This interaction makes arbutin more difficult to release from bases. Another factor that may influence was viscosity from formula 1 and 2 which is more viscous than control, it cause arbutin molecules difficult release from bases also. The

penetration enhancer can be added in the formula. Sesame oil as an oily enhancer has total protein (25%) and globulin (67.3%) it can increase penetration through polar pathway by enlarge aqueous channel. Sesame oil also can use as healing effect from sunburn.³ It was known Sesame oil effective concentration as enhancer up to 10%.⁴ The aim of this study was to investigate the influence of sesame oil (3, 5, and 7% w/w) addition on the arbutin (3% w/w) penetrations in the Carbomer-940 gel base through the modified lipid membrane. It was observed on inhibition of enzyme tyrosinase activity. However sesame oil is a viscous fluid can increase the viscosity of base so that it feared inhibits the release of arbutin and decrease penetration. In this study determined arbutin release from the base using cellophane membrane and buffer phosphate pH 7.0 as media at $37 \pm 0.5^\circ\text{C}$ for six hours long.

2. MATERIALS AND METHODS

2.1 Preparation of the arbutin gel as Lightening product

The arbutin in Carbomer-940 gel base formulas as lightening product was shown in table 1. In this research Carbomer-940 gel base contained tri ethanol ammine (TEA) as alkalizing agent, propylene-glycol as humectants, methyl-parabene and propyl-paraben as preservative, Na-EDTA as chelating agent, butylated hydroxyl toluene (BHT) as anti-oxidant and Tween-80 as surfactant. Arbutin 3% w/w in Carbomer-940 gel base was used as control. Arbutin 3% w/w with sesame oil 3% w/w in Carbomer-940 gel base named as F1, Arbutin 3% w/w with sesame oil 5% w/w in Carbomer-940 gel base named as F2 and Arbutin 3% w/w with sesame oil 7% w/w in Carbomer-940 gel base named as F3.

2.2 The Characteristics determination of the arbutin gel

The Characteristics determination of arbutin gel included:

1. Determination of gel pH
2. Determination of the spreading-ability

Determination of gel spreading-ability was performed using a pair of glass plate (20 X 20 cm). The gel preparation (1 gram) was put in the middle of the first glass plate that given the scale. Then put the second glass plate on the first glass plate and measured the diameter of gel spreading. After that put ballast on the second glass plate then measured the diameter spreading-ability of the gel. The weight of ballast that put on the second plate was increased until spreading-ability of the gel was constant.

2.3 Determination of arbutin release

Determination of arbutin release from the bases was done by the dissolution tester *Hanson Research SR-6* with paddle stirrer. Each cell diffusion fill with arbutin gel (± 2 grams), in 500mL buffer phosphate pH 7.0, temperature 37°C , agitation 100 rpm. Samples (5mL) were taken at 5, 10, 15, 30, 45, 60, 90, 120, 180, 210, 240, 270, 300, 330, and 360 minutes, replace with 5mL buffer phosphate pH 7.0 to keep volume constant. The absorbance of arbutin in the sample measured by spectrophotometer. The arbutin release (flux) from the base obtained from the slope of the linear regression of the correlation curve between arbutin releases accumulations versus square root of time.

2.4 The penetration evaluation arbutin gel (United Stated Pharmacopoeia, 2002)

In vitro study for the penetration of the arbutin in Carbomer gel base was measured by the modification method of the penetration test USP XXV and British Pharmacopoeia, 2002 with diffusion apparatus ERWEKA DT 700.

The in vitro study was evaluated as follows: The arbutin gel (around 3 grams) was put in the diffusion cell then covers with the Millipore membrane which

increase of viscosity may inhibit the movement of molecules to release from bases.⁷

Flux value of formula 3 not statistically different with control but higher than formula 1 and 2. It might be caused by addition of sesame oil reduce amount of water from formula. Decrease amount of water caused increase of arbutin concentration on water phase. Substance release from bases is known as diffusion. Based on Fick's law, diffusion is the process by which molecules moved from compartment with high concentration to low concentration.

The arbutin effectiveness as lightening agent calculated as inhibition percent (%) of enzyme tyrosinase activity. The result of arbutin inhibition percent (%) with enhancer sesame oil in Carbomer gels shows in table 7. The result of ANOVA one way test of the arbutin effectiveness in carbomer gel formulas found the value of $F_{\text{calculation}} (23,582) > F_{\text{table}} (4.07)$, and from the HSD test result was found inhibition percent of control < formula 1 = formula 2 < formula 3. Increasing of arbutin effectiveness more is caused by enhancer effect of sesame oil.

Table1: Formulas of lightening product

Material	Concentration (% w/w)				
	Base	Control	F1	F2	F3
Arbutin	-	3	3	3	3
Sesame oil	-	-	3	5	7
Carbomer 940	1	1	1	1	1
TEA	1	1	1	1	1
Propylene glycol	20	20	20	20	20
Methyl-parabene	0,15	0,15	0,15	0,15	0,15
Propyl-parabene	0,05	0,05	0,05	0,05	0,05
Na EDTA	0,05	0,05	0,05	0,05	0,05
BHT	0,05	0,05	0,05	0,05	0,05
Tween 80	0,5	0,5	0,5	0,5	0,5
Water up to	100	100	100	100	100

Table 2: The Arbutin gel pH values

Formula	pH value				
	R ₁	R ₂	R ₃	Mean	% CV

Control	6.24	6.21	6.04	6.16 ± 0.11	1.75
F1	6.34	6.34	6.38	6.35 ± 0.02	1.88
F2	6.16	6.36	6.37	6.30 ± 0.12	1.88
F3	6.43	6.38	6.38	6.40 ± 0.03	0.45

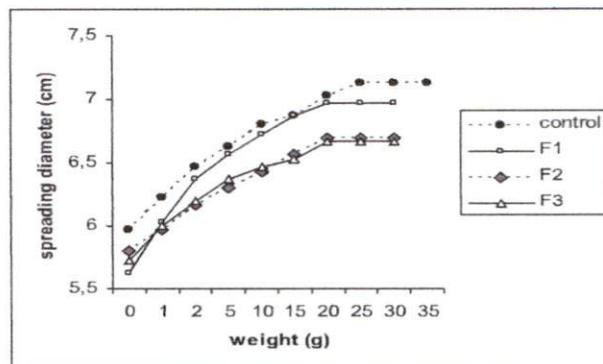


Fig 1: The spreading profile of arbutin gel with various concentration of sesame oil. Each value represents the mean of 3 determinations

Table 3: Spreading-capacity of arbutin gels at 20 gram ballast

Formula	Spreading Diameter (cm)* at 20 gram ballast
control	7.03 ± 0.06
F1	6.97 ± 0.15
F2	6.70 ± 0.00
F3	6.67 ± 0.06

* The result were obtained from an average of 3 times replication

Table 4: HSD test result of spreading- capacity value of arbutin gels

Formula	N	Value groups of spreading-capacity (cm)	
		1	2
F3	3	6.667	
F2	3	6.700	
F1	3		6.967
control	3		7.033

Table 5: Arbutin gels spreading-ability

Formula	Spreading-ability (cm/g)*
control	0.0444 ± 0.0033
F1	0.0545 ± 0.0091
F2	0.0396 ± 0.0044
F3	0.0310 ± 0.0034

* The result were obtained from an average of 3 times replication

Table 6: Flux of arbutin release from gel bases

Formula	Replication	Flux (µg/cm ² /menit ^{1/2})	Mean ±SD
Control	1	438.4026	435.2053±11.76
	2	422.1708	
	3	445.0424	
F1	1	359.0422	374.4403±14.84
	2	388.6486	
	3	375.6301	
F2	1	377.4143	384.3350±6.05
	2	388.6486	
	3	386.9422	

	1	440.0723	
F3	2	462.3000	453.5138±11.82
	3	458.1690	

Table 7: The arbutin effectivity (inhibition %) in carbomer gel formulas

Formula	Inhibition (%)			Mean	% CV
	R1	R2	R3		
control	37.50	35.98	36.53	36.67 ± 0.77	2.10
F1	41.77	40.87	41.80	41.48 ± 0.53	1.27
F2	44.82	45.51	43.96	44.76 ± 0.78	1.73
F3	52.44	48.61	45.51	48.85 ± 3.47	7.11

4. CONCLUSION

Conclusion of this study was sesame oil addition 3 and 5% w/w decreased arbutin release, sesame oil addition 3, 5 and 7% w/w increased arbutin penetrations. Increasing of arbutin effectiveness more is caused by enhancer effect of sesame oil.

5. ACKNOWLEDGEMENT

This study was supported financially by Project Grant of Faculty of Pharmacy, Airlangga University, Surabaya - Indonesia.

6. REFERENCES

1. Takada K, Tanaka Y. Depigmentation Agents. *In: Elsner, P., Mailbach, H.I. (Eds.). Cosmetics and Active Cosmetics: Drugs Versus Cosmetics*, New York: Marcell Dekker, Inc., 2000. p.512
2. Zulkarnain I. Cosmetics Skin Lightening and The Problem in Periodic Dermatology and Venereology, 2003; 15(1): 47-53.
3. Alvarez, A., and Rodriguez, M., 2000. Lipid in Pharmaceutical and Cosmetic Preparation, Vol.51 Fasc 1-2. Sevilla: Facultad de Farmacia, Universidad de Sevilla.
4. Dinda SC, and Ratna Vijay. Enhancement of Skin Permeation of Ibuprofen from Ointments and Gels by Sesame Oil, Sunflower Oil, and Oleic Acid. 2008; Available: <http://www.ijpsonline.com>

- Volume 2 (3), 2014, Page-241-245
5. Avanti C. Uji Spektrofotometrik Kinetika Hambatan Kojic Acid terhadap Aktivitas Mushroom Tyrosinase. *Berkala Ilmu Penyakit Kulit dan Kelamin*. 2003; 15(1): 23-27
 6. Luanratana O, Gritsadapong P. Anti-Tyrosinase Activities of The extracts from Thai Mulberry Twigs and The Whitening Cream. *J National Research Council of Thailand*. 2005; Vol.37 (2).
 7. Martin A., et al, 1993. *Physical Pharmacy, Physical Chemical Principles in the Pharmaceutical Sciences*, 3rd Ed, Lea & Febiger