

In Vitro Antifungal Susceptibility Testing of Tea Tree Oil (TTO) 5% Compared with Nystatin against *Candida sp.* as Important Agent of Oral Candidiasis in HIV/AIDS Patients

Eva Lydiawati¹, Muhammad Yulianto Listiawan¹, Dwi Murtiastutik¹, Rahmadewi¹, Cita Rosita Sigit Prakoeswa¹, Christina Avanti², Endang Wahyu Fitriani², Erwin Astha Triyono³, Linda Astari¹, Iskandar Zulkarnain¹

¹Department of Dermatology and Venereology, Faculty of Medicine, Universitas Airlangga /Dr. Soetomo General Academic Teaching Hospital, Surabaya, Indonesia

²Faculty of Pharmacy, Universitas Surabaya, Surabaya, Indonesia

³Department of Internal Medicine, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Academic Teaching Hospital, Surabaya, Indonesia

ABSTRACT

Background: Oral candidiasis is the most common clinical manifestation in a person infected with HIV which has been linked with the severity of the disease. *Candida albicans* responsible for most oral candidiasis. The increased resistance to the available antifungal drugs can reduce the efficacy of therapy. Therefore, it will be crucial to discover novel antifungal agents. One of them is tea tree oil (TTO) or *Melaleuca alternifolia* which has a potent antifungal effect to inhibit the growth of *Candida sp.* **Purpose:** To evaluate the antifungal susceptibility of TTO 5% compared with nystatin against *Candida sp.* taken from HIV/AIDS patients. **Methods:** The study assessed the antifungal effect of TTO 5% and nystatin against 33 isolates of *Candida sp.* that was isolated from the oral cavity of 30 HIV/AIDS patients in Dr. Soetomo General Academic Teaching Hospital Surabaya, Indonesia. Antifungal susceptibility was evaluated by the disc diffusion method. The diameter of the inhibition zone was determined as the result of this study. **Result:** The most strains found in this study was *Candida albicans* (84.8%). The mean inhibition zone of nystatin against all strains was 23.24 mm whether it was 17.55 mm for TTO 5%. The inhibition zone of both TTO 5% and nystatin in *Candida non-albicans* were tended to be higher than in *Candida albicans*. It revealed that the inhibition zone of TTO 5% significantly lower than nystatin ($P = 0.00$; $P < 0.05$). **Conclusion:** Therefore, the antifungal susceptibility of nystatin was significantly higher than TTO 5% against *Candida albicans* and non-*albicans*.

Keywords: tea tree oil, *Melaleuca alternifolia*, nystatin, antifungal susceptibility testing, oral candidiasis, HIV/AIDS.

Correspondence: Iskandar Zulkarnain, Department of Dermatology and Venereology, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Academic Teaching Hospital, Jl. Mayjend Prof. Dr. Moestopo No. 6-8 Surabaya 60131, Indonesia. Telepon: 0818309859, email: zuljazid@yahoo.com.

INTRODUCTION

Oral candidiasis (OC) is a kind of infection that is caused by *Candida sp.* in oral mucous membrane. It is the most common clinical manifestation in HIV/AIDS patients. It has several manifestations that can be acute, subacute, and chronic infections.^{1,2} Most of patients with HIV/AIDS have experienced OC in the course of its illness and found in patient with CD4 T-cell count around and $< 200/\text{mm}^3$ with high viral load number.²⁻⁴ In these population, *Candida albicans* (*C. albicans*) is the species that is commonly found for most of infections.⁵ The most common etiology of OC in HIV/AIDS patients are *C. albicans* in Surabaya, Indonesia in around 54% of the subjects² and also in Malang, Indonesia.⁶ While there was also some non-*albicans* species that cause this infection, like *C. glabrata*, *C. krusei*, *C. parapsilosis*, and *C.*

tropicalis.^{2,5}

The main treatment of OC is by using antifungal treatment that can be applied orally or topically on the oral mucous membrane.^{5,7} The mostly found topical treatment is nystatin oral drop that is also the primary treatment of OC in Dr. Soetomo General Academic Teaching Hospital Surabaya, Indonesia.⁸ The study in Iran showed that there was 4% subjects in that study that was resistance to nystatin,⁹ although in the low number of nystatin resistance. Therefore, it become very important for the discovery of new antifungal agents in order to widen the spectrum of activity against *Candida* and increase the effectiveness of the OC treatment.

There are also several natural products have shown its efficacy to be the candidate of alternative therapy for OC. One of those natural products is

Melaleuca alternifolia (*M. alternifolia*) or commonly known as tea tree oil (TTO). It shown potential antifungal effect against *Candida sp.*¹⁰ It showed that the active component, terpinen-4-ol, controlled the growth of *C. albicans* in vitro.^{10,11} The minimum inhibitory concentration (MIC) was 4.84-25.33% with minimum fungicidal concentration (MFC) was around 25.33-32.00%. MIC showed the minimal concentration of some product can inhibit the growth of *Candida sp.*⁵ Based on the MIC, we choose the 5% concentration to be analysed in this study in the gel emulsion (emulgel) base products.

The objective of this study was to evaluate the antifungal susceptibility of TTO 5% compared with nystatin against *Candida sp.* taken from HIV/AIDS patients in order to subsidize new therapeutic strategies for this infection.

METHODS

Subject in this research were HIV/AIDS patients at Dr. Soetomo General Academic Teaching Hospital Surabaya, Indonesia. Inclusion criteria of subject were patient diagnosed with HIV/AIDS that have been diagnosed of OC and had several clinical manifestations of OC like acute pseudo membranous OC, acute or chronic atrophic OC, perleche, and hyperplastic OC. Those diagnoses confirmed by positive result of potassium hydroxide (KOH) examination. They were more than or equal to 21-year-old and willing to take part in the study. Criteria exclusion of this study was the HIV/AIDS patient with OC that was treated with antifungal treatment, systemically or topically, between 2 weeks prior the study. Subject who were willing to take part in this study get an explanation regarding the research and assign the informed consent form prepared by the researcher.

This laboratory experimental study was held from Desember 2019 to February 2020. This study was conducted in UPIPI Dr. Soetomo General Academic Teaching Hospital, Surabaya, Indonesia and Surabaya Health Laboratory, Indonesia. The number of subjects were 30 HIV/AIDS patients who went through the identification process.

The procedure of this study began with the specimen taken from the oral tissue swabs then was implanted into the CHROMagar *Candida* media. The culture was grown for about 36-48 hours and followed by the species identification tests. The species that was found in this study were 33 strains consists of *C. albicans* and non-*albicans*. The antifungal susceptibility testing was performed by using disc diffusion method on Mueller Hinton agar with 2% glucose and methylene blue. *Candida* species isolates

were implanted in the agar, then paper discs containing nystatin and TTO 5% were placed on the media. It was observed in 24-48 hours and the resistance zone was measured with the calipers. The resistance zone then was compared between TTO 5% and nystatin. The results were documented, which then be presented and evaluated in the form of tables and graphs. The data then were analyzed using SPSS Statistics 26 version application. This research has obtained ethical approval from the Ethics Committee of Dr. Soetomo General Academic Teaching Hospital Surabaya (1651/KEPK/XI/2019).

RESULT

We analyzed 30 subjects that has characteristic stated on the Table 1. There were 33 *Candida* strains collected from oropharyngeal mucous membrane of HIV/AIDS patients, 28 (84.80%) of them was *C. albicans*. The non-*albicans* was also found in 5 (15.20%) strains, consisted of *C. glabrata* (9.10%) and *C. tropicalis* (6.10%) like we can observed on Figure 1. There was more than one species of *Candida* that was found on 2 patients.

All the strains of *Candida* showed the inhibition zone in nystatin. The mean diameter of the nystatin inhibition zone of 33 strains was 23.24 mm, while the nystatin inhibition zone of *C. albicans* was 23.25 mm and non-*albicans* was 23.20 mm. We used the sensitivity criteria according to Clinical and Laboratory Standards Institutes (CLSI) for nystatin¹² (Table 2). According to the criteria we observed that all the strains were sensitive to nystatin and no strains that were resistant to this drug.

The mean diameter of the TTO 5% inhibition zone off 33 strains was 17.55 mm, while the TTO 5% inhibition zone of *C. albicans* was 17.43 mm and non-*albicans* was 18.20 mm. There was no CLSI criteria for TTO, so we could not conclude the sensitivity of this drug. The antifungal susceptibility that was comparable between TTO 5% and nystatin was the inhibition zone diameter (mm).

The mean diameter of inhibition zone of nystatin was greater than TTO 5%, which was 23.24 mm compared to 17.55 mm (Figure 2). The non-parametric statistical result showed that there was significance difference between the diameter of inhibition zone between TTO 5% and nystatin ($P = 0.00$; sig. < 0.05). The TTO 5% inhibition zone of *C. albicans* and non-*albicans* were also smaller than nystatin. The inhibition zone of both TTO 5% and nystatin in *Candida* non-*albicans* were tend to be higher than in *Candida albicans*. It revealed us that the inhibition zone of TTO 5% significantly lower than nystatin. So that, we

observed that the fungistatic effect of TTO 5% was lower compared to nystatin in this study.

Table 1. Demographic Data of Patient

No	Basic Data				
	Category	Group	N	%	p
1.	Sex	Man	26	86.70	0.61
		Woman	4	13.30	
2.	Age	Late teens (18 – 25 year)	1	3.80	0.64
		Early adult (26 – 35 year)	12	46.20	
		Late adult (46 – 55 year)	8	30.80	
		Early senior adult (46 – 55 year)	8	30.80	
		Late senior adult (56 – 65 year)	1	3.80	
3.	Education	Graduated from elementary school	3	11.50	0.05
		Graduated from junior high school	1	3.80	
		Graduated from high school	22	84.60	
		Graduated from diplome/S1	4	15.40	
4.	Occupation	Unemployed	10	33.30	0.19
		Civil servants	1	3.30	
		Private employees	11	36.70	
		Student	1	3.30	
		Housewives	2	6.70	
		Driver	3	10.00	
		Trader	2	6.70	

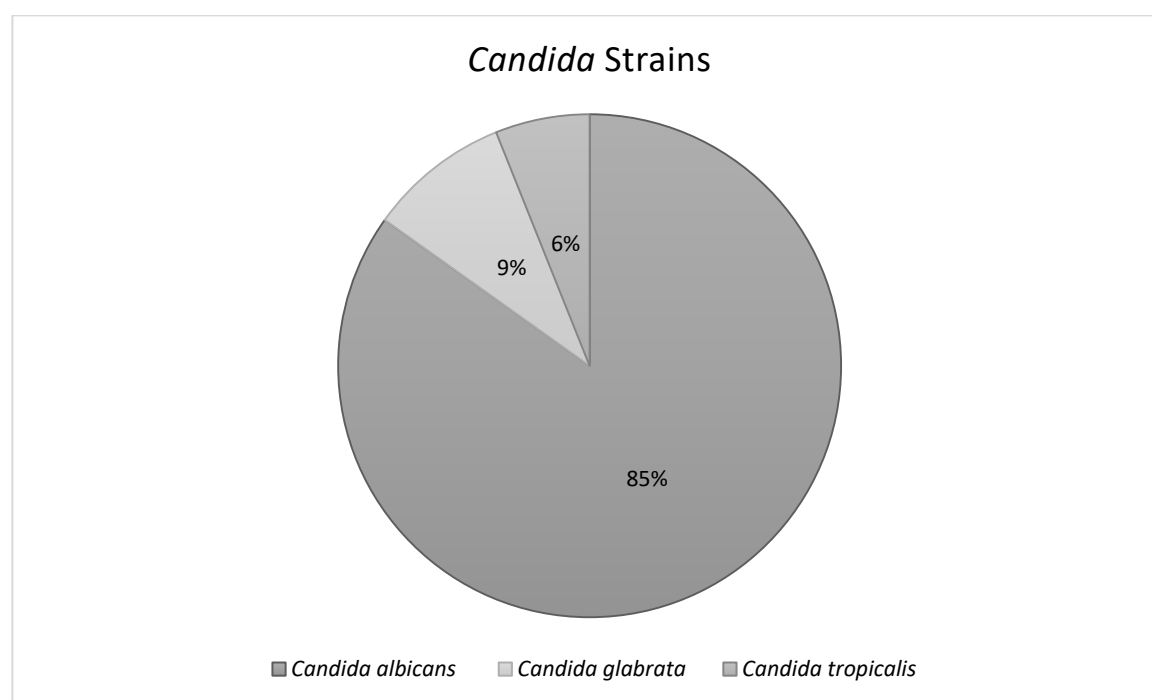


Figure 1. The *Candida* strains found in this study.

Table 2. Nystatin inhibition zone for *Candida sp.*¹²

Drug	Potention	Inhibition Zone Diameter (mm)		
		Sensitive	Intermediate	Resistant
Nystatin	50 µg/disc	≥ 15	10-14	No inhibition zone

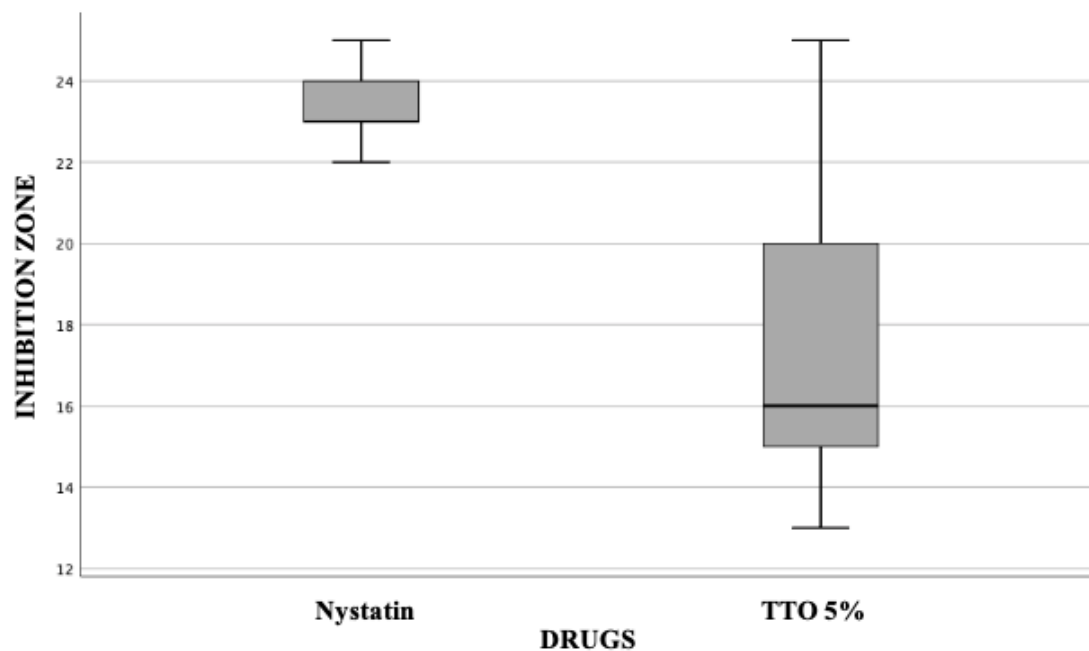


Figure 2. The diameter of inhibition zone comparison between TTO 5% and nystatin.

DISCUSSION

Oral candidiasis (OC) is an opportunistic fungal infection commonly found in HIV-positive patients, that is caused by *Candida sp.*⁵ *Candida albicans* had shown as a widespread species in HIV/AIDS patients.^{7,9} The result in this study show that although there were some non-*albicans* strains, *C. albicans* remains the most prevalent species that is caused OC in the subjects.

Nystatin proved to be sensitive to all species found in this study. The sensitivity also proved in other research held in Indonesia and other country.^{2,6,12,13} Moges et al. proved that 96.8% *Candida sp.* in their study in Ethiopia (2013) were sensitive to nystatin.¹⁴ But, there were also research that showed that some species were resistant to nystatin, like in the study held by Dar et al. in India (2015) stated that 61.1% subjects were sensitive, 36.1% intermediate, and 2.8% resistant to nystatin.¹⁵ This could be caused by the changes in sterol composition in the *Candida*'s cell membrane that could decrease the affinity of the this drug to the membrane itself.^{7,16}

TTO 5% exhibited the antifungal effect against *Candida sp.* in this study. This effect was proved by the TTO inhibition formed in the media with the diameter of 17.55 mm in all species. Hammer et al. established the study that proved that TTO and its component increased the membrane cell permeability. This could inhibit the growth of *Candida sp.*¹⁷ TTO could also produce membrane lipid bilayers like structure that change the component to make the membrane intact. This changes lead to inhibition of growth of *Candida*.^{17,18}

The mean diameter of TTO inhibition zone of *Candida albicans* were slightly shorter than the non-*albicans* species. It means that the antifungal susceptibility of TTO against *C. non-albicans* was better than those in *C. albicans*. This was similar that was found by Oro et al (2015). Those study proved that the MIC of *C. albicans* was higher than *C. non-albicans*. MIC of *C. albicans* and non-*albicans* was 20.03% and 4.84% respectively. TTO need higher concentration to inhibit the growth of *C. albicans*.⁵ This could be caused by the ability of *C. albicans* to form germination tube and biofilm, so that it could protect the fungi from the environmental changes caused by TTO.¹⁹ The small sample of non-*albicans* species might be affect those result too.

The diameter of nystatin inhibition zone was significantly larger than TTO 5%. This could be caused by the mechanism of those drugs that were slightly different. Nystatin found to bind ergosterol as the main component of fungal cell membrane. It produced the pore-like structure and lead to the leakage of the plasma lead to fungal cell death.²⁰ This was different with TTO mechanism, in which TTO also altered the permeability of fungal cell membrane, but it could not produce pore-like structure like it was happened in nystatin.²¹ TTO had fungistatic properties, but the fungicidal effect was only found in the higher concentration.^{5,21}

This study used TTO with 5% in concentration. This concentration was chosen because of the reason to use the minimal concentration that was effective with low toxicity risk, in order to prepare the drug to be used by human in the future. This was according to the MIC

proved by Oro et al with the MIC TTO in 4.84-25.33%.⁵ TTO could inhibit the respiration process of *Candida sp.* in dose-dependent manner. The higher dose that have been used, the better inhibition of the fungal activity.¹⁹ The toxicity effect of TTO like skin and mucous membrane irritation, allergic contact dermatitis, erythema or bullous reaction, and hypersensitivity could be found in the higher dose or concentration.^{22,23} The use of TTO with concentration up to 20% was thought to be safe and had no serious side effect.²³

In conclusion, based on the result of this study, nystatin and TTO showed antifungal effect against *Candida sp.* isolated from HIV/AIDS patients. Therefore, the antifungal susceptibility of nystatin was significantly higher than TTO 5% against *Candida albicans* and non-*albicans*. Moreover, the TTO in higher concentration (TTO 10%) needs further investigation to be compared with TTO 5% to establish the optimal concentration of antifungal treatment of CO in HIV/AIDS patient.

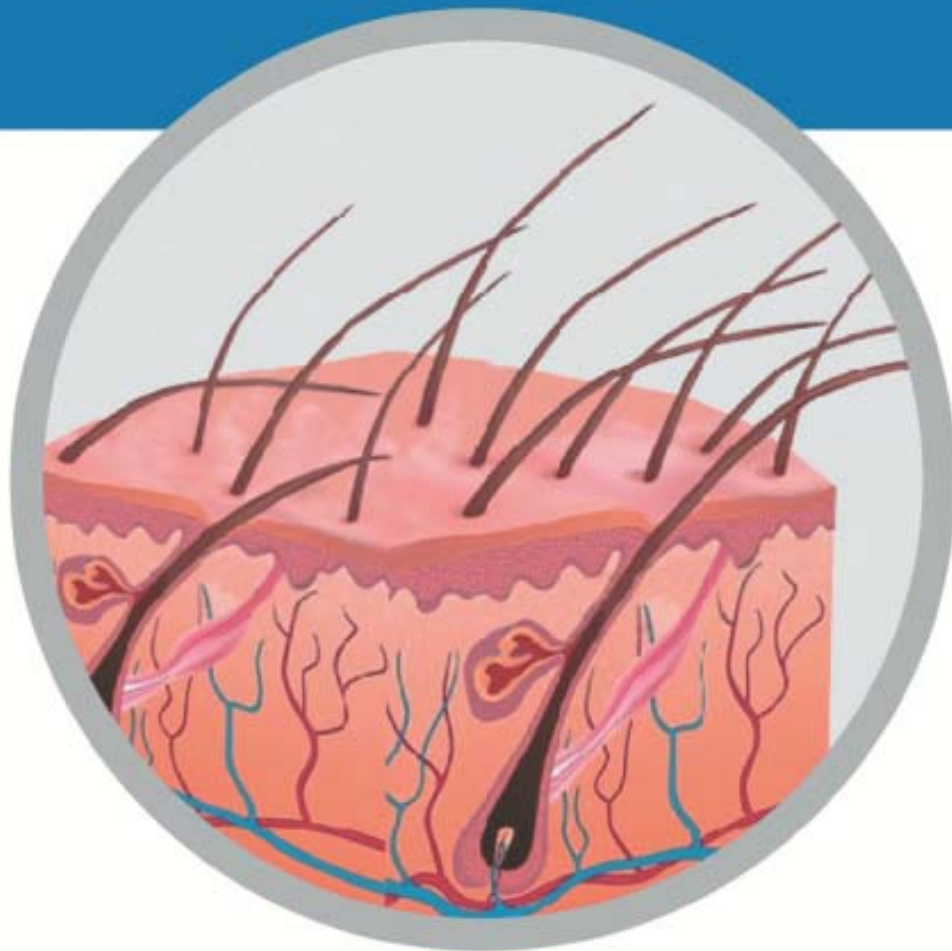
References

- Kundu R V., Garg A. Yeast Infections: Candidiasis, Tinea (Pityriasis) Versicolor, and Malassezia (Pityrosporum) Folliculitis. In: Goldsmith LA, Katz SI, Gilchrist BA, Paller AS, Leffel DJ, Wolff K, editors. Fitzpatrick's dermatology in general medicine. 8th ed. New York: McG. 2012. p. 2298-301.
- Murtiastutik D, Maharani CS, Rahmadewi R. Profile of Candida Resistancy to Fluconazole in Male Patient with Oral Candidiasis and HIV/AIDS. J AIDS Clin Res 2019; 10(1): 1-6.
- Berberi A, Noujeim Z, Aoun G. Epidemiology of Oropharyngeal Candidiasis in Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome Patients and CD4 + Counts. J Int Oral Heal 2015; 7(3): 20-3.
- Nugraha AP, Ernawati DS, Parmadiati AE, Soebadi B, Triyono EA, Prasetyo RA, et al. Prevalence of Candida Species in Oral Candidiasis and Correlation with CD4+ Count in HIV/AIDS Patients at Surabaya, Indonesia. J Int Dent Med Red 2018; 11(1): 81-5.
- Oro D, Heissler A, Rossi EM, Scapin D, da Silva Malheiros P, Boff E. Antifungal Activity of Natural Compounds Against Candida Species Isolated from HIV-Positive Patients. Asian Pac J Trop Biomed 2015; 5(9): 781-4.
- Reza NR, Sugiman T, Basuki S. Uji Kepekaan In Vitro Flukonazol terhadap Spesies Candida penyebab Kandidiasis Oral Pada Pasien HIV/AIDS dengan Vitek II (In Vitro Susceptibility Test of Fluconazole to Candida spp in Patients with Oropharyngeal Candidiasis and HIV / AIDS with Vitek II). BIKKK 2017; 29(3): 234-42.
- de Oliveira Santos GC, Vasconcelos CC, Lopes AJO, de Sousa Cartagenes M do S, Filho AKDB, do Nascimento FRF, et al. Candida Infections and Therapeutic Strategies: Mechanisms of Action for Traditional and Alternative Agents. Front Microbiol 2018; 9(1351): 1-23.
- RSUD Dr. Soetomo. Panduan Praktik Klinis (PPK) Kandidiasis Oral. 2014. p. 1-29.
- Mohamadi J, Motaghi M, Panahi J, Havasian MR, Delpisheh A, Azizian M, et al. Anti-Fungal Resistance in Candida Isolated from Oral and Diaper Rash Candidiasis in Neonates. Bioinformation 2014; 10(11): 8-11.
- Catalán A, Pacheco JG, Martínez A, Mondaca MA. In vitro and In Vivo Activity of Melaleuca alternifolia Mixed with Tissue Donditioner on Candida albicans. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008; 105: 327-32.
- Mondello F, Bernardis F De, Girolamo A, Cassone A, Salvatore G. In Vivo Activity of Terpinen-4-ol, The Main Bioactive Component of Melaleuca alternifolia Cheel (tea tree) Oil against Azole-Susceptible and -Resistant Human Pathogenic Candida species. BMC Infect Dis 2006; 6(158): 1-9.
- Djajusman SK, Tedjosasongko U, Irmawati I. Daya Hambat Xylitol dan Nistation terhadap Pertumbuhan Candida albicans (in vitro) (Inhibition Effect of Xylitol and Nistatin Combination on Candida albicans Growth (in vitro)). Dent J 2014 (Maj. Ked. Gigi); 47(3): 164-7.
- Kumar DA, Muralidhar S, Banerjee U, Basir SF, Mathur P, Khan LA. Diversity and Antifungal Resistance Patterns of Prevalent Opportunistic Pathogenic Yeasts Colonizing the Oral Cavities of Asymptomatic Human Immunodeficiency Virus - Infected Individuals, and their Relation to CD4 + Counts. Indian J Sex Transm Dis AIDS 2015; 36(1): 53-8.
- Moges B, Bitew A, Shewaamare A. Spectrum and the In Vitro Antifungal Susceptibility Pattern of Yeast Isolates in Ethiopian HIV Patients with Oropharyngeal Candidiasis. Int J Microb 2016; 3037817: 1-8.
- Dar MS, Sreedar G, Shukla A, Gupta P, Rehan AD, George J. An In Vitro Study of Antifungal Drug Susceptibility of Candida Species Isolated from Human Immunodeficiency Virus Seropositive and Human Immunodeficiency Virus Seronegative Individuals in Lucknow Population Uttar Pradesh.

- J Oral Maxillofac Pathol 2015; 19(2): 205–11.
16. Fothergill AW, Sutton DA, McCarthy DI, Wiederhold NP. The Impact of New Antifungal Breakpoints on Antifungal Resistance in *Candida*. J Clin Microbiol 2014; 1: 1–18.
 17. Hammer KA, Carson CF, Riley T V. Antifungal Effects of *Melaleuca alternifolia* (Tea Tree) Oil and Its Components on *Candida albicans*, *Candida glabrata* and *Saccharomyces cerevisiae*. J Antimicrob Chemother 2004; 53(6): 1081–5.
 18. Pereira TS, de SantAnna JR, Silva EL, Pinheiro AL, de Castro-prado MAA. In Vitro Genotoxicity of *Melaleuca alternifolia* Essential Oil in Human Lymphocytes. J Ethnopharmacol [Internet] 2014; 151: 852–7.
 19. Mertas A, Garbusinska A, Szliszka E, Jureczko A, Kowalska M, Król W. The Influence of Tea Tree Oil (*Melaleuca alternifolia*) on Fluconazole Activity against Fluconazole-Resistant *Candida albicans* Strains. Biomed Res Int 2015; 2015: 1–9.
 20. Ahronowitz I, Leslie K. Yeast Infections. In: Kang, S., Amagai, M., Bruckner, A.L., Enk, A.H., Margolis, D.J., McMichael, A.J., Orringers, J.S., editors. Fitzpatrick's dermatology. 9th ed. New York: McGraw Hill. 2019; 2952–63.
 21. Carson CF, Hammer KA, Riley T V. *Melaleuca alternifolia* (Tea Tree) Oil: a Review of Antimicrobial and Other Medicinal Properties. Clin Microbiol Rev 2006; 19(1): 50–62.
 22. de Groot AC, Schmidt E. Tea Tree Oil: Contact Allergy and Chemical Composition. Contact Dermatitis 2016; 75: 129–43.
 23. Pazyar N, Yaghoobi R, Bagherani N, Kazerouni A. A Review of Applications of Tea Tree Oil in Dermatology. Int J Dermatol 2013; 52: 784–90.

p-ISSN 1978 - 4279
e-ISSN 2549 - 4082
Vol. 32 / No.3 / December 2020

Berkala Ilmu Kesehatan Kulit dan Kelamin



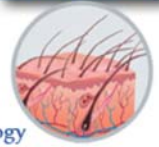
Periodical of Dermatology and Venereology

Berkala Ilmu Kesehatan Kulit Dan Kelamin



Periodical of Dermatology and Venereology

p-ISSN 1978-4279
e-ISSN 2549-4082



[HOME](#) [ABOUT](#) [LOGIN](#) [REGISTER](#) [SEARCH](#) [CURRENT](#) [ARCHIVES](#) [ANNOUNCEMENTS](#)

[Home](#) > [About the Journal](#) > **Editorial Team**

EDITORIAL TEAM

EDITOR IN CHIEF

Prof. Dr. Cita Rosita Sigit Prakoeswa, dr., Sp.KK(K), FINS DV, FAADV, Faculty of Medicine, Airlangga University Surabaya, Indonesia, Indonesia

EDITORIAL MANAGER

dr. Damayanti Damayanti, Sp.KK(K), FINS DV, Faculty of Medicine, Airlangga University Surabaya, Indonesia

EDITORIAL HANDLING

dr. Irmadita Citrashanty, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Maylita Sari, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Septiana Widyantari, Sp.KK, FINS DV, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Medhi Denisa Alinda, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Hasnikmah Mappamasing, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Sylvia Anggraeni, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia

EDITORIAL BOARD

Dr. Afif Nurul Hidayati, dr., Sp.KK(K), FINS DV, FAADV, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Evy Ervianti, Sp.KK(K), FINS DV, FAADV, Faculty of Medicine, Airlangga University Surabaya, Indonesia, Indonesia, Indonesia
dr. Linda Astari, Sp.KK(K), FINS DV, FAADV, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Astindari Astindari, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
Prof. Dr. med. Isaak Effendy, Academic Teaching Hospital Bielefeld Klinikum Bielefeld, Germany Dermatology and Allergology, Germany
Prof. dr. Taruna Ikrar, M.Pharm, MD., Ph.D, Biomedical Science, The National Health University, California, United States
dr. Sri Manovita Pateda, S.Ked., M.Kes, Ehime University, Japan, Japan
dr. Jimmy Rusdian Masjkur, M.Sc., Ph.D, University Hospital Carl Gustav Carus Dresden, Germany, Germany
Robert Tungadi, S.Si., M.Si., Apt, Aachen University, Germany, Germany
dr. David Sudarto Oeiria, Sp.KK, FINS DV, FAADV, Division of Dermatologic Surgery, Dept. of Dermatology, Huashan Hospital - Fudan University, Shanghai, China

ASSISTANT EDITOR

dr. Yuri Widia, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Menul Ayu Umborowati, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Bagus Haryo Kusumaputra, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Putri Hendria Wardhani, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia
dr. Regitta Indira Agusni, Sp.KK, Faculty of Medicine, Airlangga University Surabaya, Indonesia

e-ISSN 2549-4082
p-ISSN 1978-4279



Instruction for Author

[Author Guidelines](#)

[Online Submission](#)

Journal Policy

[Focus and Scope](#)

[Publication Ethics](#)

[Peer Review Process](#)

[Article Processing Charge](#)

[Editorial Team](#)

[Open Access Policy](#)

[Archiving](#)

[Plagiarism](#)

[Copyright](#)

[Contact](#)

[Old Website](#)

AUTHOR GUIDELINES



TEMPLATE



AUTHOR DECLARATION FORM



NOTIFICATIONS

[View](#)
[Subscribe](#)

JOURNAL CONTENT



Ciptaan disebarluaskan di bawah [Lisensi Creative Commons Atribusi-NonKomersial-BerbagiSerupa 4.0 Internasional](#).

00262893

[View My Stats](#)


[HOME](#) [ABOUT](#) [LOGIN](#) [REGISTER](#) [SEARCH](#) [CURRENT](#) [ARCHIVES](#) [ANNOUNCEMENTS](#)
[Home](#) > [Archives](#) > **Vol 32, No 3 (2020)**

VOL 32, NO 3 (2020)

DECEMBER

TABLE OF CONTENTS

RESEARCH / RETRO

Antifungal Activity of Rosmarinus Officinalis Essential Oil and Nystatin on Store Isolate of Candida species from HIV/AIDS Patients with Oral Candidiasis


167-173

doi 10.20473/bikk.V32.3.2020.167-173

Bernadya Yogatri Anjuwita, Iskandar Zulkarnain, Muhammad Yulianto Listiawan, Evy Ervianti, Rahmadewi Rahmadewi, Pepy Dwi Endraswari, Damayanti Damayanti, Dwi Murtiastutik
Behavior of Sunscreen Usage Among Medical Students


174-181

doi 10.20473/bikk.V32.3.2020.174-181

Triana Novitasari, Subur Prajitno, Diah Mira Indramaya
Comparison of In Vitro Testing Antifungal Activity between Rosemary Essentials Oil and Fluconazol on Candida species Isolate from HIV/AIDS Patients with Candidiasis Oral


182-188

doi 10.20473/bikk.V32.3.2020.182-188

Putri Intan Primasari, Dwi Murtiastutik, Pepy Dwi Endraswari, Cita Rosita Sigit Prakoeswa, Evy Ervianti
In Vitro Antifungal Susceptibility Testing of Tea Tree Oil (TTO) 5% Compared with Nystatin against Candida sp. as Important Agent of Oral Candidiasis in HIV/AIDS Patients


189-194

doi 10.20473/bikk.V32.3.2020.189-194

Eva Lydiawati, Muhammad Yulianto Listiawan, Dwi Murtiastutik, Rahmadewi Rahmadewi, Cita Rosita Sigit Prakoeswa, Christina Avanti, Endang Wahyu Fitriani, Erwin Astha Triyono, Linda Astari, Iskandar Zulkarnain
The Correlation between Human papillomavirus and Increased Expression of p53 in Seborrheic Keratosis


195-199

doi 10.20473/bikk.V32.3.2020.195-199

Fesdia Sari, Sri Lestari, Rina Gustia, Ennesta Asri, Tofrizal Tofrizal
The Effectiveness of 5% Tea Tree Oil cream, 10% Tea Tree Oil cream, and 5% Permethrin Cream for Scabies Treatment in Pediatric Patients


200-205

doi 10.20473/bikk.V32.3.2020.200-205

Chesia Christiani Liuan, Muhammad Yulianto Listiawan, Dwi Murtiastutik, Evy Ervianti, Sawitri Sawitri, Cita Rosita Sigit Prakoeswa, Linda Astari, Farhat Surya Ningrat, Kurniati Kurniati, Endang Wahyu Fitriani, Irmadita Citrashanty, Regitta Indira Agusni, Iskandar Zulkarnain
The Effectiveness of Autohemotherapy in Chronic Urticaria Treatment in the Dr. Mohammad Hoesin General Hospital and Pertamina Hospital Palembang


206-213

doi 10.20473/bikk.V32.3.2020.206-213

Nopriyati Husan, Sarah Diba Zulkarnain, Athuf Thaha, Maria Mayfinna Gozali, Tiar Marina Octyvani
The Efficacy of Lactobacillus plantarum as Adjunctive Therapy of Bacterial Vaginosis: A Double-blind, Randomized, Placebo-controlled Trial


214-220

doi 10.20473/bikk.V32.3.2020.214-220

e-ISSN 2549-4082
p-ISSN 1978-4279

Instruction for Author

[Author Guidelines](#)[Online Submission](#)

Journal Policy

[Focus and Scope](#)[Publication Ethics](#)[Peer Review Process](#)[Article Processing Charge](#)[Editorial Team](#)[Open Access Policy](#)[Archiving](#)[Plagiarism](#)[Copyright](#)[Contact](#)[Old Website](#)

AUTHOR GUIDELINES



TEMPLATE



AUTHOR DECLARATION FORM



NOTIFICATIONS

[View](#)
[Subscribe](#)

JOURNAL CONTENT

Ridha Ramadina Widiatma, Muhammad Yulianto Listiawan, Dwi Murtiastutik, Cita Rosita Sigit Prakoeswa, Sawitri Sawitri, Ingrid Suryanti Suryono, Linda Astari, Afif Nurul Hidayati

Sensibility Test of Candida species against Nystatin, Ketoconazole, and Fluconazole on Oral Candidiasis with HIV/AIDS using Disc Diffusion Method

PDF
221-231

doi 10.20473/bikk.V32.3.2020.221-231

Cut Shelma Maharani, Rahmadewi Rahmadewi, Afif Nurul Hidayati, Dwi Murtiastutik

LITERATURE REVIEW

Management of Eumycetoma

PDF
232-238

doi 10.20473/bikk.V32.3.2020.232-238

Tjokorde Istri Nyndia Vaniari, Sunarso Suyoso, Linda Astari, Yuri Widia, Sylvia Anggraeni, Evy Ervianti

CASE REPORT

Coinfection of High-Risk and Low-Risk Human Papillomavirus in Urethra Condylomata Accuminata

PDF
239-243

doi 10.20473/bikk.V32.3.2020.239-243

Lita Setyowatie, Noor Hidayah

Lipschutz Ulcer in A Virgin Woman: A Case Report

PDF
244-249

doi 10.20473/bikk.V32.3.2020.244-249

I Gusti Ayu Agung Elis Indira, Vanessa Vijayamurthy, Made Dwi Puspawati, Anak Agung Gde Putra Wiraguna



Ciptaan disebarluaskan di bawah [Lisensi Creative Commons Atribusi-NonKomersial-BerbagiSerupa 4.0 Internasional](#).

00262891

[View My Stats](#)



Pusat Pengembangan Jurnal dan Publikasi Ilmiah
Universitas Airlangga
copyright©2017 Template PPJPI

Search

Search Scope

All

Search

Browse

[By Issue](#)

[By Author](#)

[By Title](#)

[Other Journals](#)

FONT SIZE

USER

Username

Password

☐ Remember me

Login



Visitors	
	89,869
	329
	6,035
	263
	1,153
	220
	484
	197
	389
	190



New! – Science And Technology Index (SINTA) Version 3.0

[Click Here](#)

Journal Profile

Berkala Ilmu Kesehatan Kulit dan Kelamin (Periodical of Dermatology and Venerology)

eISSN : 25494082 | pISSN : 25494082

[Health](#) [Science](#)

[Universitas Airlangga](#)



S2

Sinta Score



Indexed by GARUDA

9

H-Index

8

H5-Index

518

Citations

466

5 Year Citations

*Penerbit:*

Fakultas Kedokteran Universitas Airlangga

[Website](#) | [Editor URL](#)

Address:

Jl. Mayjen Prof. Dr. Moestopo No. 6-8 Surabaya 60286
Surabaya

Email:

berkalakulit@yahoo.com

Phone:

+62315501609

Last Updated:
2016
2021-05-25

2017

2018

2019

2020

2021





⏮ ⏪ 1 2 3 4 5 ⏩ ⏭

Page 1 of 55 / Total Records : 543

Publications	Citation
<u>Lactobacillus plantarum IS-10506 supplementation reduced SCORAD in children with atopic dermatitis</u> CRS Prakoeswa, N Herwanto, R Prameswari, L Astari, S Sawitri, ... Beneficial microbes 8 (5), 833-840	36
<u>Studi Retrospektif: Faktor Pencetus Akne Vulgaris</u> P Ayudianti, DM Indramaya Berkala Ilmu Kesehatan Kulit dan Kelamin 26 (1), 1-7	22
<u>Etiopatogenesis dermatofitosis</u> PCRS Kurniati Berkala Ilmu Kesehatan Kulit dan Kelamin 20 (3), 243-50	22
<u>Viral Load pada infeksi HIV</u> L Astari, SYE Sawitri, D Hinda Berkala Ilmu Kesehatan Kulit dan Kelamin 21 (1), 31-8	19
<u>Lactobacillus plantarum IS-10506 supplementation reduced SCORAD in children with atopic dermatitis</u> CRS Prakoeswa, N Herwanto, R Prameswari, L Astari, S Sawitri, ... Beneficial microbes 8 (5), 833-840	18
<u>StudiRetrospektif: Diagnosis dan Terapi Pasien Melasma</u> MA Umborowati, R Rahmadewi Berkala Ilmu Kesehatan Kulit dan Kelamin 26 (1), 1-8	15
<u>The effects of amniotic membrane stem cell-conditioned medium on photoaging</u> CRS Prakoeswa, FD Pratiwi, N Herwanto, I Citrashanty, DM Indramaya, ... Journal of Dermatological Treatment	15
<u>The effects of amniotic membrane stem cell-conditioned medium on photoaging</u> CRS Prakoeswa, FD Pratiwi, N Herwanto, I Citrashanty, DM Indramaya, ... Journal of Dermatological Treatment	14
<u>Profil Spesies Candidapada Pasien Kandidiasis Oral dengan Infeksi HIV&AIDS</u> T Walangare, T Hidayat, S Basuki Berkala Ilmu Kesehatan Kulit dan Kelamin 26 (1), 1-7	14

Publications	Citation
<u>Staphylococcus aureus sebagai Penyebab Tersering Infeksi Sekunder pada Semua Erosi Kulit Dermatitis Vsikobulosa</u> D Rosalina, S Martodihardjo, MY Listiawan Berkala Ilmu Kesehatan Kulit & Kelamin 22 (2), 102–108	12

Page 1 of 55 | Total Records : 543

Citation Statistics

