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Effect Of Kepyar Leaf Extract 25% As Disinfection Materials Against Candida Albicans Of Denture At RSGM USU

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Abstract
Background*: Dentures are a device that can replace the function of missing teeth. The denture base material commonly used is hot polymerized acrylic resin which has good biological properties giving certain microorganisms the ability to colonize such as Candida albicans. Dentures can be disinfected with non-traditional and traditional materials. In traditional ingredients there is castor leaf extract (Ricinus communis) which contains tannin, saponin, phenol and flavonoid compounds which are effective as antifungals.*
Method: *castor leaf extract (Ricinus communis) leaves were extracted with a concentration of 25%. Disinfection of denture base samples in chlorhexidine with concentration of 25%, castor oil extract to observe the Candida albicans inhibition zone*
Results: *The diameter of the inhibitory zone of the phytochemical compound of jatropha leaf extract (Ricinus communis) as a denture disinfection agent against Candida albicans is with the smallest value being 10.2 mm and the largest value being 14.6 mm. Based on the values obtained in this study, distance kepyar leaf extract with a concentration of 25% has an inhibitory zone against Candida albicans that is still within the normal threshold value.*
Conclusion*: There is an effect of castor oil leaf extract as a denture disinfection agent on the inhibition zone of Candida albicans.*
Keyword: *Denture Disinfection, Kepyar Leaf Extract, Inhibition Zone of Candida Albicans*

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I. Introduction

A denture is a device used to replace missing teeth. Dentures are divided into two types: removable partial dentures and full dentures. The denture consists of a base and artificial tooth elements that improve the chewing process. The denture base is the part of the denture that contacts the oral mucosa. Ideally, denture base materials have good biocompatibility, radiopaque and aesthetic properties.[1] Denture base materials can be made of metal and non-metal. Non-metallic materials consist of thermoplastics and thermosets in terms of their thermal properties. One of materials classified as thermoplastic is thermoplastic nylon. Meanwhile, materials classified as thermosets are *silicon*, vulcanite and acrylic resins.

Chemical denture disinfection consists of traditional and non-traditional materials. Non-traditional materials for denture disinfection are sodium hypochlorite, alkaline peroxide, chlorhexidine and glutaraldehyde and are on the market. Chlorhexidine is a bis-biquanite derivate that is effective, fast acting and low toxic. Chlorhexidine digluconate is an antiseptic and disinfectant that is effective against bacteria, viruses, and fungi including *Candida albicans*.[6] Dentures that use 0.2% chlorhexidine gluconate disinfection agent are recommended to be soaked for 15 minutes every day because it can inhibit viruses and is active against fungi in dentures.[7,8] Chlorhexidine is a gold standard denture disinfection material and is proven to reduce the growth of microorganisms, and in a study conducted by Kamal et al (2010) chlorhexidine had a strong inhibition zone against several fungal species, especially *Candida albicans* by 22.9 mm.

Disinfection agents containing readily available natural ingredients with superior biocompatibility and low development costs. Currently, the material being studied in all fields of health is the castor bean plant (*Ricinus communis*). Castor bean plant (*Ricinus communis*) leaf extracts have shown antibacterial activity against various pathogenic bacteria. *Candida albicans* can be inhibited by the mechanism of action of flavonoids by causing disruption of the ethanol permeability of fungal cells. Tannins also have an antifungal mechanism, namely their ability to inhibit chitin synthesis used for cell wall formation in fungi and damage cell ethanol so that fungal growth is inhibited. In a study conducted by Sukmawati et al (2017) said that Jatropha curcas leaves (Jatropha

curcas L.) containing saponins, flavonoids, and tannins can inhibit the growth of *Candida albicans* fungi at concentrations of 25%, 50% and 75% with the average inhibition zone formed at a concentration of 50% which is 14.98 mm and at a concentration of 25% which is 12.08 mm and is classified as an inhibitory zone.

II. Method

Tools and materials

The sample in this study used patients wearing removable partial dentures and acrylic full dentures. As a consideration to prevent bias during the research, the sample size of each group was increased to 9 subjects. Thus, the total number of subjects was 27. Subject inclusion criteria:

1. Acrylic denture wearers (partial and full removable)
2. Minimum usage of 1 week
3. No systemic disease

Sample making

Fill the acrylic resin in the mold. Polymer and monomer are stirred in a porcelain pot with a ratio of 2 gr: 1 ml according to the manufacturer's instructions and wait until the dough reaches the dough stage. The mold that has been smeared with the separator is completely filled with acrylic resin mixture. Plastic cellophane is placed between the top and bottom cuvettes, then closed and pressed gently with a hydraulic press with a pressure of 1000 psi. The cuvette was opened and the excess acrylic was cut off, then the cuvette was closed again, pressing was done with a pressure of 2200 psi. The water bath is filled with water, the temperature and time are set at 70°C for 90 minutes and 100°C for 30 minutes. The cuvettes were removed from the water bath and allowed to cool to room temperature. The final sample was removed from the cuvette, then trimmed to remove sharp edges using a Fraser bur. The samples were then ground with waterproof sand paper with numbers 400, 600 and 1000 under running water using a rotary grinder until they obtained the desired size. Samples were soaked in distilled water for 48 hours before being given treatment to remove residual monomers.

Extract manufacture

Extract preparation, Jatropha leaves are washed with running water. Dry in an open room that is not exposed to direct sunlight to dry. Then grind it into powder using a blender. Jatropha leaf powder was macerated using 70% ethanol with a ratio of 1:10 at room temperature for 5 days accompanied by stirring. The liquid extract was then filtered using filter paper (maserat I). Repeat the extraction process on the dregs using 70% ethanol to obtain macerate II**.**

Preparation of test solutions

Preparation of test solutions with various concentrations using standard mother liquor (LIB). LIB 6 gr/10 ml (Concentration 60%). You need 30 ml LIB, 6x3 = 18 gr. Weigh 18 g condensed castor oil extract and then dilute it with 30 ml DMSO to produce 30 ml of 60% jatropha leaf extract. The concentration is lowered, 50

÷ 60 x 10 = 8.3 ml, take 8.3 ml of jatropha leaf extract, then add 1.7 ml of DMSO. Produce 10 ml of jatropha leaf extract with a concentration of 50%?

Measurement of Inhibition Zone Against Candida Albicans

After the research subjects were obtained, the calibration treatment called period I was carried out for 1 week. Subjects in the 3 groups were instructed to rinse their mouths with clean water after every meal, and clean the denture using a soft toothbrush, and remove the denture and soak it in a container of water every night.

a. The subjects were divided into 3 groups, namely:
   - Group 1 denture disinfection with distilled water
   - Group 2 denture disinfection with chlorhexidine
   - Group 3 denture disinfection with 25% jarak kepyar leaf extract
b. Swabs were performed on subjects from the 3 groups using cotton buds on the
   At the beginning of period one (day one), a swab was performed on the palate surface of the oral cavity and the intaglio surface of the denture in contact with the palate. The swab was performed for 30 seconds with a dimension of 1x1cm per area, namely the anterior, right, left, and posterior areas. The determination of the area aims to make swab more evenly distributed and not repetitive.
c. The swab was put into 10 ml of Phosphate buffered saline, vibrated with a vortex for 2 minutes to release *Candida albicans* and *Streptococcus mutans* attached to the subject. Furthermore, from the 10 ml, 0.1 ml of Phosphate Buffered Saline was taken and then seeded on Potato dextrose agar (PDA), and incubated for 48 hours at $37^{O}C$.
d. After 48 hours, *Candida albicans* and *Streptococcus mutans* were counted. with units of CFU/ml in 100mm using a colony counter.

e. The calculation results are entered into the initial table for period I.
f. On the seventh day of period I, swabs were taken in the same way as on the first day. The results of swab incubation were then counted and used as data for CFU before both the results of swab incubation on the palatal surface and the intaglio surface of the denture.
g. The treatment period was 4 days with a simulation of 1 year, carried out on the subjects of the 3 groups.
h. Swabs were performed on subjects from the 3 groups using cotton buds at the beginning of period one (day one), .
i. After 4 days, the swab was counted for *Candida albicans* and *Streptococcus mutans.*
j. The result of the calculation becomes the final data.

Statistics

Univariate test analysis to determine the average standard deviation of each group. One-way Anova test analysis to determine the effect of disinfection of kepyar castor leaf extract on *candida albicans*.

III. Research Result

Concentration of 25% of the diameter of the *Candida albicans* inhibition zone formed on agar media was measured using callipers with millimeter units. The results showed that the diameter of the *Candida albicans* inhibition zone in group A with 25% concentration of jarak kepyar leaf extract with the smallest value was 10.2 mm and the largest value was 14.6 mm.

The diameter of the *Candida albicans* inhibition zone formed on agar media was measured using a calliper in millimeters. The results showed that the diameter of the *Candida albicans* inhibition zone in group A with chlorhexidine as a disinfecting agent, the smallest value was 11.0 mm and the largest value was 15,3 mm. The diameter of the Candida albicans inhibition zone in group B with Kepyar leaf extract concentration of 25% as a disinfecting agent with the smallest value was 11.0 mm and the largest value was 15,3 mm. The diameter of the Candida albicans inhibition zone in group C with Aquadest as a disinfecting agent with the largest value was 0,5 mm.

Table 1. Diameter of Zone of Inhibition of *Candida albicans* on Heat Polymerized Acrylic Resin Denture Base After Chlorhexidine Disinfection and Kepyar Leaf Extract (*Ricinus communis*)

No.	Nama	Zona Hambat (Ekstrak Daun Jarak Kepyar)	Zona Hambat (Klorheksidin)	Zona Hambat (Aquades)
1,	MR Hutabarat	11,2	12,5	0
2,	Siti Rafeah	11,2	13,3	0
3,	Nabil, S.AG	13,5	15,2	0
4,	Sumarni Sinambela	10,6	12,3	0
5,	Suriani	13,6	13,9	0
6,	Irwansyah	10,4	11,0	0
7,	Irma Hotma Uli	10,5	13,2	0
8,	Ronauli Sihombing	12,2	12,7	0
9,	Roysuddin	11,4	12,8	0
10,	Johannes Wiro	11,2	13,7	0
11,	Yulia Sari Lubis	11,3	13,2	0
12,	Mariati Br Rajagukguk	12,3	13,2	0
13,	Wiwik Juliani	14,6	15,3	0
14,	Aisyah	11,3	12,3	0
15,	Linda Wahyuni	13,4	15,2	0
16,	Muhammad Effendi	11,6	13,2	0
17,	Agusman Sinaga	11,5	13,2	0
18,	Hery Husni Halwa	10,4	11,2	0
19,	Rahmawati	10,4	12,1	0
20,	Sriharyati	11,3	12,2	0
21,	Ermadi	11,3	12,4	0
22,	Freddy Harry T	12,4	13,4	0
23,	Barita RH Sinaga	10,2	12,1	0
24,	Sumaryadi	10,6	12,3	0
25,	Radius Hatta Damanik	10,4	11,2	0,5
26,	Asril Noor	11,5	13,2	0
27,	Yartik	11,6	13,2	0
28,	Suryono	14,4	15,3	0
29,	Siti Rumlah	14,6	14,8	0
$X \pm$ SD		11,76 ± 1,33	13,09 ± 1,20	0,02 ± 0,09

IV. Conclusions

The diameter of the zone of inhibition of phytochemical compounds of Kepyar castor leaf extract (*Ricinus communis*) as a denture disinfection material against *Candida albicans* is with the smallest value being 10.2 mm and the largest value being 14.6 mm. Based on the values obtained in this study, the 25% concentration of jarak kepyar leaf extract has an inhibition zone against *Candida albicans* still within the threshold of normal values.

References

[1] Azmy NA, 2020, Ricinus Communis L. Leaf Extract As A Natural Antimicrobial: Development Of New Antimicrobials Against Microbes, MDR Medula 10 (3): 443-447.

[2] Hosing C, Dixit S, Mooth A, Diwan N, 2011, Role Of Candida Albicans In Denture Stomatitis. Journal Of Indian Academy Of Oral Medicine And Radiology 23(4): 617-19.

[3] Ibrahim I, Jaya F, Luthfia P, Izzati DPA, 2016, Effect Of Soaking Time In Chlorhexidine Solution On Color Change Of Heat Cured Acrylic Resin, JMKG 5 (1): 7-14.

[4] Komala O, Yulianita, Siwi FR, 2019 Antifungal Activity Of 50% Ethanol And 96% Ethanol Extracts Of Henna Nail Lawsonia Inermis L Leaves Against Trichophyton Mentagrophytes, Ekologia: Scientific Journal Of Basic And Environmental Sciences, 19 (1): 12-19.

[5] Nurhayat LS, Yahdiyani N, Hidayatulloh A, 2020, Comparison Of Antibacterial Activity Testing Of Yogurt Starter With The Well Diffusion Method And Disc Diffusion Method, J Livestock Products Technology 1 (2): 41-46.

[6] Pristianingrum N, Soebagio, Munadziroh E, 2013, Microbiological Stability Test Of Denture Cleaner With Cinnamon Bark Essential Oil (Cinnamomum Burmannii), J PDGI 62(3): 89-94.

[7] Putranti DT, Fadilla A. Titanium Dioxide Addition TO Heat Polymerized Acrylic Resin Denture Base Effect On Staphylococcus Aureus And Candida Albicans. J Indonesian Dent Association 2018; 1(1): 21- 27.