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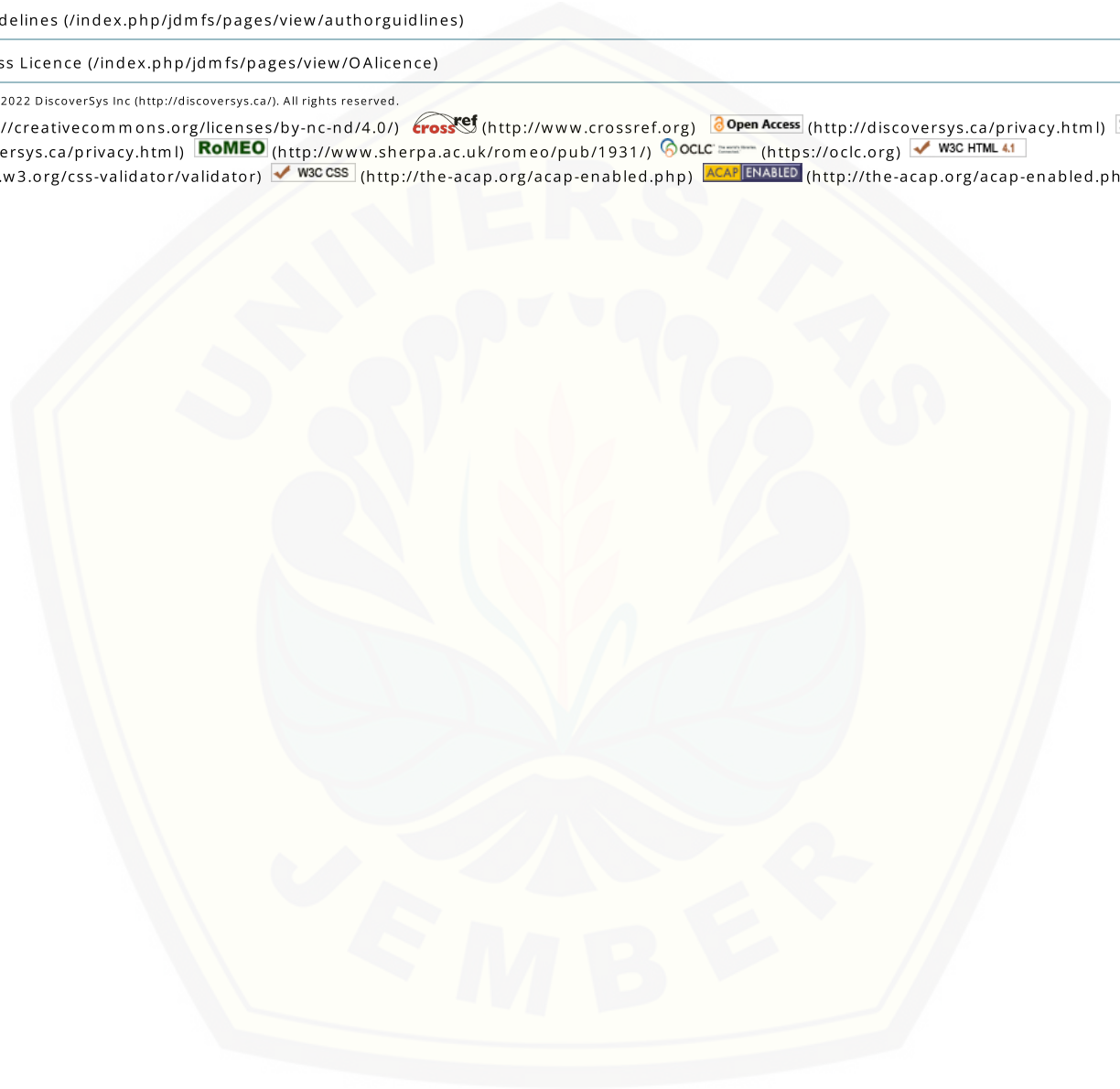
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## Effervescent tablets of tobacco leaves (*Nicotiana tabacum* L.) potential as denture cleansers



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Dewi Kristiana,\* Ady Soesetijo, A. Gunadi, Rahardyan Parnadji, Amiyatun Naini

### ABSTRACT

**Objective:** Poor denture hygiene could be a risk factor for denture stomatitis. Tobacco leaves (*Nicotiana tabacum* L.) can be used as a base for denture cleaning because tobacco leaves contain ingredients that are antibacterial and antifungal. Is there any effect of tobacco leaf extract (*Nicotiana tabacum* L.) effervescent tablets with a concentration of 25%, 50%, 75%, as an acrylic resin denture cleaner on the growth of *C. albicans* and an effective concentration in the formulation of tobacco leaf extract effervescent tablets as a acrylic resin denture cleaner against the growth of *C. albicans*

**Material and Methods:** The type of this research is a laboratory experimental study with a randomized posttest only control group design. The samples were divided into 5 sample groups, namely: acrylic plate immersed in Effervescent tablet of tobacco leaf extract with a concentration of 25%, 50%, 75% for 30 minutes, acrylic plate

for the commercially sold effervescent tablet for 20 minutes and acrylic plate immersed in distilled water for 30 minutes. The acrylic resin plate contaminated with *C. albicans* was then measured using a spectrometer to see the turbidity. Then the data analyzed using one way ANOVA.

**Results:** There were significant differences in all groups, except for the effervescent tablets of tobacco leaf extract (*Nicotiana tabacum* L.) with 75% concentration and commercially sold denture cleanser effervescent tablets which was .473. There was no significant difference.

**Conclusion:** Effervescent tablets of Tobacco leaf (*Nicotiana tabacum* L.) are 75% effective in inhibiting *C. albicans* with immersion time of 30 minutes.

**Keywords:** *C. albicans*, *Nicotiana tabacum* L, Tablet efferecents  
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### Introduction

Many people in the world have lost their teeth and the prevalence of edentulousness increases with age.<sup>1</sup> This condition results in a high prevalence of tooth loss and denture wearers.<sup>2</sup> Acrylic dentures are dentures that are still often used by the general public, where they have the function of restoring oral function, improving aesthetic speech function and increasing self-confidence.<sup>3</sup> The function of dentures is to restore esthetics, restore speech function, restore mastication, maintain remaining tooth tissue and prevent tooth migration. Many people use dentures that are based on heat-cured acrylic resin. Many people use dentures that are based on heat-cured acrylic resin because of its lower cost, easy application and polishing, and use of simpler equipment.<sup>4</sup> The disadvantages of heat cured acrylic are the presence of residual monomers that can cause cytotoxicity in some patients.<sup>5</sup> Heat cured acrylic has a relatively low impact strength so that the dentures could break easily.<sup>6</sup> The prevalence of denture users in the Indonesian population with treatment in the form of removable and fixed dentures ranges from 0.6%-10.8%, the highest at the age of 65 years and over.<sup>7</sup> The results of Syahril and et al's research showed that out of the 28 elderly (43.1%) who lost more than eight natural teeth, 23 of them used artificial teeth.<sup>8</sup>

Denture wearers must be diligent in cleaning their dentures. The denture base can be colonized and infected by microorganisms under long-term use.<sup>9</sup> In addition, efficient denture hygiene and maintenance is very necessary to maintain general health for denture wearers. Poor denture hygiene is a risk factor for denture stomatitis. The oral cavity is colonized by a variety of pathogens and microbes that can cause several infections including denture stomatitis, aspiration pneumonia, and lung and gastrointestinal infections.<sup>10</sup>

Acrylic resin dentures which have porous properties can cause adhesion of microorganisms, the formation of denture biofilms and denture plaque. Denture biofilms and denture plaque can contain bacteria and fungi that can trigger denture stomatitis. According to Singh A, al that 56% of elderly denture users are prone to infection with *C. albicans*, which is the main microorganism in denture stomatitis.<sup>11</sup> The fungus *C. albicans* found in denture biofilms has an important role in the development of denture stomatitis. *C. albicans* can be penetrated and attached to the denture acrylic resin and penetrate tissue with lytic enzymes that can damage the epithelial cells.<sup>12</sup> The high presence of *C. albicans* in dentures can cause denture stomatitis, if denture wearers do not clean their dentures regularly. In dentures, *C. albicans* was frequently

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found (65%), whereas *S. mutans* and *S. aureus* were 53.3% and 34.4%, respectively.<sup>13</sup> Candida-Associated Denture Stomatitis (CADS) states that denture stomatitis in 60-65% of denture wearers has more widespread clinical manifestations and this percentage increases to 75%.<sup>14</sup> Denture stomatitis is an oral candidiasis infection and the reported prevalence varies widely, reaching up to 65% of denture users.<sup>15</sup> Denture stomatitis can be prevented by using denture cleaners. Maintaining the cleanliness of the dentures can be done by mechanical, chemical methods, or a combination of both.<sup>10</sup> Nishi et al.<sup>16</sup> reported that daily immersion of dentures in denture cleaning agents is an effective method to reduce the number of microorganisms adhering to the dentures.<sup>16</sup>

The Indonesian people have long recognized and used medicinal plants as an effort to overcome health problems. Herbal medicine is an alternative that can be used for the healing process of disease, namely by utilizing the potential of herbal plants in the natural environment. The side effects of traditional medicine are relatively small when used appropriately.<sup>17</sup> One of the herbal plants that can be used as denture cleaning agents is tobacco leaves (*nicotiana tabacum* L.). Tobacco leaves can be used as a base for denture cleansers, because tobacco leaves contain ingredients that are antibacterial and antifungal.<sup>18</sup> The active ingredients include the phenol group in the form of flavonoids, the alkaloid group in the form of nicotine, the saponin group in the form of steroids.<sup>19</sup> Tobacco extracts have been shown to effectively inhibit the growth of gram-positive bacteria, Gram-negative bacteria, and acid-fast Mycobacterium, and also effectively against opportunistic *C.albicans* and cryptococcus neoformans.<sup>20</sup> Cleaning the dentures can be done by immersing them in effervescent tablet liquid. Denture cleanser in the form of effervescent tablets can easily serve a good cleaning without causing damage to the resin surface.<sup>21</sup> Effervescent tablets are denture cleaners that have the ability to mechanically remove the denture surface biofilm from the bubbles that have been generated de Anrade.<sup>22</sup> Immersion time in effervescent tablets includes short-term immersion (3-30 minutes).<sup>23</sup>

Based on the description above, the problem arises that can be formulated, is there an effect of effervescent tablets of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 25%, 50%, 75%, as a denture cleaner acrylic resin on the growth of *C. albicans*?

## Material and Methods

This type of research is a laboratory experimental



Figure 1. Acrylic resin plates

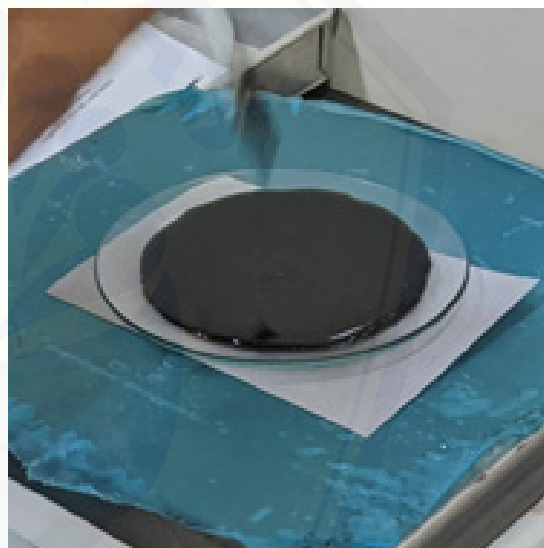
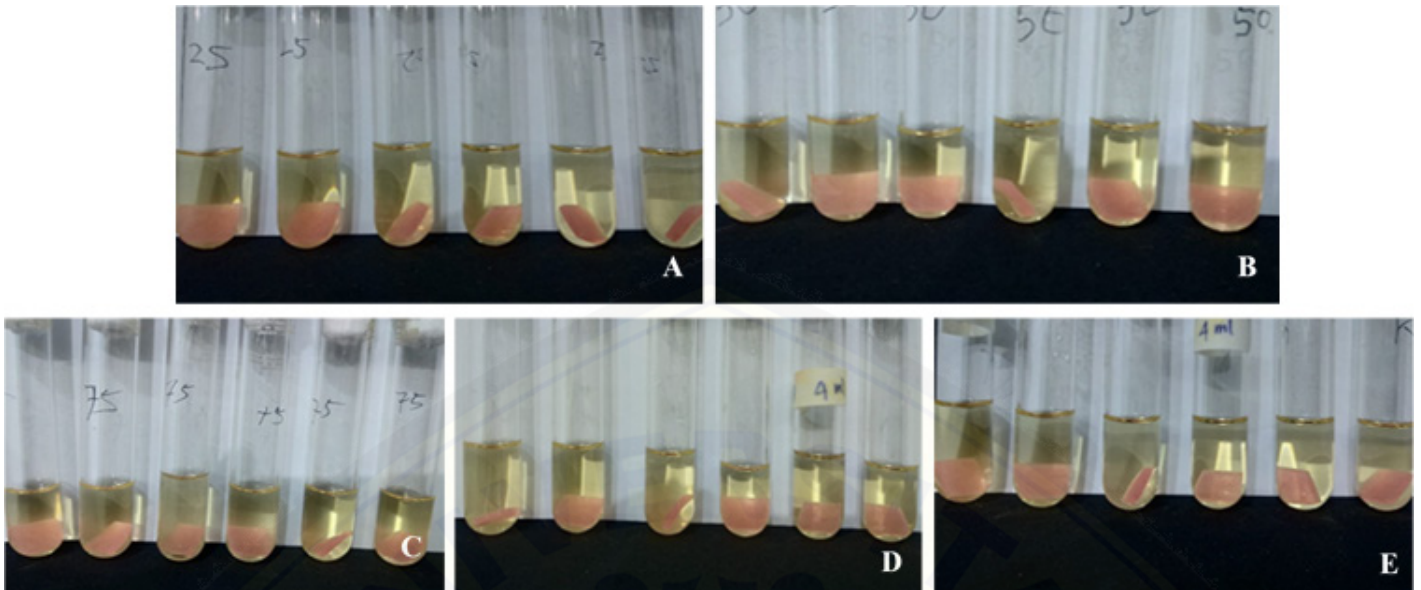


Figure 2. Extract of tobacco leaves



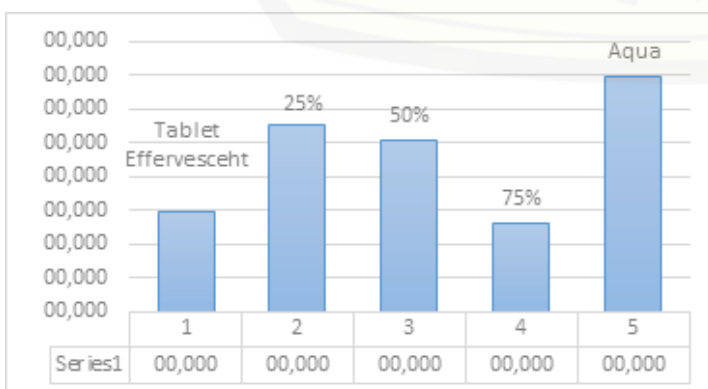
Figure 3. Tobacco leaf extract effervescent tablet



**Figure 4.** A. Acrylic plates immersed in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 25%, B. Acrylic plates immersed in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 50%, C. Acrylic plates immersed in 75% concentration of tobacco leaf extract (*Nicotiana tabacum* L.) effervescent liquid, D. Acrylic plates immersed in denture cleanser in the market, E. Acrylic plates immersed in distilled water

**Table 1.** The average amounts of *C. albicans* cells on acrylic resin plates after immersion in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with concentrations of 25%, 50%, 75%, market denture cleanser effervescent tablets and distilled water

No	Denture cleanser	The average amounts of <i>C.albicans</i> cells (x 106 CFU/ml).
1.	Tobacco leaf extract ( <i>Nicotiana tabacum</i> L.) effervescent tablets with a concentration of 25%	4.36
2.	Tobacco leaf extract ( <i>Nicotiana tabacum</i> L.) effervescent tablets with a concentration of 50%	3.35
3.	Tobacco leaf extract ( <i>Nicotiana tabacum</i> L.) effervescent tablets with a concentration of 75%	1
4.	Denture cleanser effervescent tablets on the market	1.36
5.	Distilled water	6.27



**Figure 5.** Bar diagram of the number of *C. albicans* cells in each treatment

study with a randomized posttest only control group design. The research sample was a plate of heat-cured acrylic resin with a size of 10 x 10 x 2 mm and polished on one side. Acrylic resin plate as shown in figure 1. The number of samples is 48 samples. In this study the sample was divided into 5 sample groups: Group I: 6 samples contaminated with *C. albicans* and immersed in the Effervescent tablet formulation of tobacco leaf extract at a concentration of 25% for 30 minutes; Group II: 6 samples contaminated with *C. albicans* and immersed in the effervescent tablet formulation of tobacco leaf extract at a concentration of 50% for 30 minutes; Group III: 6 samples contaminated with *C. albicans* and immersed in the effervescent tablet formulation of tobacco leaf extract at a concentration of 75% for 30 minutes; Group IV: 6 samples contaminated with *C. albicans* and immersed in market effervescent tablets for 20 minutes; Group V: 8 samples contaminated with *C. albicans* and immersed in distilled water for 30 minutes.

The tobacco leaf extract was made by drying the tobacco leaves and then extracted using 70% ethanol. Tobacco leaf extract as shown in figure 2. The manufacture of tobacco leaf extract effervescent tablets is by granulating the tobacco leaf extract that has been obtained with dextrin to produce a granular mass.

The acid granule was made by mixing betel leaf granules, citric acid, tartaric acid, and part of the PVP. Meanwhile, the manufacture of alkaline

**Table 2.** Summary of Least Signification Different (LSD) test results on acrylic resin plates after immersion in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with concentrations of 25%, 50%, 75%, market effervescent tablet denture cleanser and distilled water (x106 CFU / ml).

Group	Group				
	75%	50%	25%	effervescent tablets on the market	distilled water
75%		0.000*	0.000*	0.000*	0.000*
50%	0.000*		0.000*	0.000*	0.000*
50%	0.000*	0.000*		0.000*	0.000*
effervescent tablets on the market	0.000*	0.000*	0.000*		0.001*
distilled water	0.000*	0.000*	0.000*	0.001*	

The \* sign indicates a significant value

granules by mixing sodium bicarbonate with the remaining PVP. Then the manufacturing process is carried out at room temperature and maintained air humidity. Then add PVP in dry form, then moisten with 70% ethanol drop by drop. Then sieve the mass to be granulated with a 14-mesh sieve in order to get granules with a homogeneous size. Then the granules are dried in an oven at a temperature of 40-60°C. Then make a tablet by passing a large amount of granule mass into a tablet-pressing machine. Tobacco leaf extract effervescent tablets as shown in [figure 3](#)

Acrylic resin plates were immersed in sterile saliva for 1 hour, then rinsed with PBS pH 7 (measured by pH meter) twice for 15 minutes. After making contact with saliva, the acrylic plate will immediately be coated with pellicle, after 2 hours plaque will form. The acrylic resin plate was inserted into a test tube containing the *Candida albicans* suspension, then incubated for 24 hours at 37 ° C. Furthermore, the acrylic resin plate was inserted into a test tube, each containing effervescent tablets for denture cleaning tobacco leaf extract with a concentration of 25%, 50%, 75%, with a soaking time of 30 minutes, denture cleanser effervescent tablets in the market with a soaking time of 20 minutes and sterile aquadet for 30 minutes soaking time then rinsed with PBS for 15 minutes. The acrylic resin plate was inserted in 10 ml of sabouraud's broth, then vibrated with vortex on all reaction tubes for 30 seconds to remove the *Candida albicans* attached to the acrylic resin plate. Next, calculate the number of *C.albicans* using a spectrophotometer.

If the research results have been obtained, then tabulate the data according to each group. The data normality test used the Shapiro-Wilk test and the homogeneity test used the Levene

test, followed by the One-way Anova parametric test with a significance degree of 0.05. One-Way ANOVA parametric test if significant or significant results are obtained, it can be tested for multiple comparisons, which is the LSD denture cleanser effervescent tablets on the market.

## Results

Hygiene and oral hygiene denture lower denture wearers can cause the formation and accumulation of biofilm in the oral cavity, which can lead to Denture stomatitis. Therefore, denture hygiene is important to prevent various oral diseases and to prevent denture stomatitis. The image below shows an acrylic resin plate that has been contaminated with *C albicans*, then immersed in effervescent tablets of tobacco leaf extract (*Nicotiana tabacum* L.) as a denture cleanser with a concentration of 25%, 50% and 75% with long soaking. [Figure 4A](#) shows an acrylic plate immersed in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 25%. [Figure 4B](#) shows an acrylic plate immersed in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 50%. [Figure 4C](#) shows an acrylic plate immersed in effervescent tablets of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 50%. As a control, the acrylic plates were immersed in market effervescent denture cleanser liquid [Figure 4D](#) and distilled water [Figure 4E](#).

The acrylic plates were immersed in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 25%, 50%, 75%, denture cleanser in the market and distilled water then measured the OD absorbance of *C. albicans* with a spectrophotometer. The results of the average OD absorbance value measurement



of *C. albicans* are: acrylic plates immersed in effervescent tablet liquid of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 25% for 30 minutes is .084500. The acrylic plate soaked in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 50% for 30 minutes is .086167, the acrylic plate soaked in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75% for 30 minutes is .083500, acrylic plate immersed in a denture cleanser on the market is 084000, and acrylic plate immersed in distilled water is .086500.

The average amounts of *C. albicans* cells on acrylic resin plates after immersion in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with concentrations of 25%, 50%, 75%, market denture cleanser effervescent tablets and distilled water (x 106 CFU / ml) shows in [table 1](#).

The OD absorbance value of *C. albicans* was used to determine the number of *C. albicans* fungal cells. The increase in the OD absorbance value of *C. albicans* indicated that the number of fungal cells increased, it means that *C. albicans* was growing. Meanwhile, the decrease in the absorbance value of *C. albicans* OD indicated that the number of living fungal cells was reduced, it means that *C. albicans* did not grow due to the antifungal properties of the immersion content.

Based on [table 1](#) the average calculation of the number of *C. albicans* cells on the acrylic resin plate can be seen that the highest number of *C. albicans* cells is found in soaking the acrylic resin plate with sterile distilled water, which is  $6.27 \times 10^6$  CFU / ml. While the lowest average number of *C. albicans* cells was found in soaking the acrylic plate with cleaning solution in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75%, which is  $1 \times 10^6$  CFU / ml. The results of the average count of *C. albicans* cells on the acrylic resin plate can be seen in the form of a bar chart in [figure 5](#).

Data analysis in this study begins with a data normality test, using the Kolmogorov-Smirnov test, indicating that the probability value is 0.82 which means that it is normally distributed. Then the analysis continued with the homogeneity test using the Levene-Statistic test showing the probability value that is .144, the data has homogeneous variations. If the data are normal and homogeneous, the analysis is continued with the One-Way ANOVA test with a confidence level of 95% indicating significant .000. Then the analysis continued with the Least Significant Different test to find out the difference between each sample group [table 2](#).

The results of the post-hoc LSD test in [table 2](#) show that there are significant differences in all groups, except for effervescent tablets of tobacco leaf extract (*Nicotiana tabacum* L.) with a concentration of 75% and denture cleanser effervescent tablets on the market, that is .473 so there is no significant difference.

## Discussion

The average amounts of *C. albicans* cells on acrylic resin plates after immersion in effervescent tablet liquid of tobacco leaf extract (*nicotiana tabacum* L.) with concentrations of 25%, 50%, 75%, market denture cleanser effervescent tablets and distilled water (x 106 CFU/ml). [Table 4.1](#) shows that the effervescent tablet of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75% for soaking the acrylic plate for 30 minutes has a smaller number than the effervescent tablet of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 25% and 50%. The amount of *C. albicans* cells in the effervescent tablets of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75% was smaller, it means that the effervescent tablet of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75% could inhibit the growth of *C. albicans*. The amounts of *C. albicans* cells in the effervescent tablet of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 75% are smaller than the amounts of *C. albicans* cells in the effervescent tablet of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 25% and 50%. This is because the higher the concentration of antimicrobial substances, the stronger the antifungal and antibacterial activity.

The results of data analysis using the one-way Anova also showed a significant difference, .000. It shows that there is a significant difference between effervescent tablets of tobacco leaf extract (*nicotiana tabacum* L.) with a concentration of 25%, 50%, 75% and the positive and negative control groups, which are denture cleanser on the market and distilled water. This is probably because the tobacco leaf extract effervescent tablets have a greater effect in inhibiting the number of *C. albicans* colonies compared to the denture cleansers on the market and distilled water. Effervescent tablets of tobacco leaf extract contain ethanol extract of tobacco leaves which is thought to have a chemical cleansing effect on *C. albicans* due to the active substances contained in it and carbon dioxide gas resulting from the effervescent tablet reaction when dissolved in water.

Then continued with the LSD test showed that there were significant differences in all groups.

The phytochemical analysis of tobacco leaf extract shows the presence of carbohydrates, fats and oils, saponins, alkaloids and tannins.<sup>24</sup> Tobacco leaves also contain active ingredients including the phenol group in the form of flavonoids, the alkaloid group in the form of nicotine, the saponin group in the form of steroids and also essential oils in the form of terpenoids. The flavonoids contained in tobacco leaves can be functioned as antioxidants.<sup>25</sup> Tannins work as a deterrent to the development of microorganisms by precipitating microbial proteins and making nutritional proteins unavailable to bacteria.<sup>26</sup>

Saponins have antifungal properties and are active against *C. albicans* and other fungi. Tobacco extracts have antifungal activity against *C. albicans*.<sup>20</sup> Saponins have very useful antifungal properties and actively fight against *C. albicans* and other fungi. In general, saponins show the ability to complex with sterols in fungal membranes which can lead to loss of membrane integrity. Complex bonds with the lipophilic part of the cell membrane can be formed by saponins, namely sterols, and can reduce membrane surface tension and increase permeability, so that the fungi will be biologically disturbed.<sup>27</sup> Saponins work as antibacterial and antifungal agents causing lysis of the bacterial cell wall and leakage of AKP (Alkaline Phosphate), the increasing concentration of saponins can cause proteins to dissolve so that intercellular compounds diffuse through the outer membrane and cell wall. Cytoplasm leaks out of the cell causes cell death.<sup>28</sup>

Effervescent tablets can clean the dentures mechanically through the bubbles generated when reacting with water.<sup>23</sup> The bubbles will move to the surface, then interact with the surrounding environment, then the bubbles will damage microorganisms and bring microorganisms to the surface of the water.<sup>29</sup> Tobacco leaf extract effervescent tablets are also classified as chemical cleaning that contain tobacco leaf extract mixed with citric acid. In addition, the use of effervescent tablets is considered more convenient because they do not require a large container to store, with the suitable size and dosage.<sup>30</sup>

## Conclusion

Effervescent tablets of tobacco leaf extract (*nicotiana tabacum* L.) are 75% effective in inhibiting *C. albicans* with immersion time of 30 minutes and have the same effectiveness as effervescent tablets on the market.

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## Conflict of Interest

The authors report no conflict of interest.

## References

- Cousson PY, Bessadet M, Nicolas E, et al. Nutritional status, dietary intake and oral quality of life in elderly complete denture wearers. *Gerodontology* 2012;29: 685-692.
- De-Andrade IMH, Cruz PC, Silva-Lovato CH, et al. Effect of chlorhexidine on denture biofilm accumulation. *J Prosthodont* 2012;21: 2-6.
- Piampring P. Problems with complete dentures and related factors in patients in Rajavithi hospital from 2007 to 2012. *J Med Assoc Thai* 2016;99(Suppl 2): 182-187.
- Botega D, Machado T, Mello JAN, Garcia RCMR, Cury AADB. Polymerization time for microwave-cured acrylic resin with multiple flasks. *Braz Oral Res* 2004;18: 23-28.
- Jorge JH, Giampaolo ET, MachadoAL, et al. Cytotoxicity of denture base acrylic resin: A literature review. *J Prosthet Dent* 2002;90: 190-193.
- Faot F, Costa MA, Cur AADB, et al. Impact strength and fracture morphology of denture acrylic resins. *J Prosthet Dent* 200;96: 367-373.
- Yunanto MYA, Adhani R, Widodo. Frequency of gingivitis in removable partial denture users review in patients with removable partial denture patients at the Cempaka Putih Health Center Banjarmasin. *Dentino J Kedokt Gigi* 2016;1: 209-213. (In Indonesia)
- Syahrial, Masulili C, Kusdhany LS. Oral health knowledge, denture status, and oral health related quality of life of the elderly. *J Int Dent Med Res* 2018;11: 1044-1048.
- Raj N, D'Souza M. Comparison of transverse strength of denture base resin on immersion for varying time period in water and denture cleansers. *Asian J Oral Health Allied Sci* 2011;1: 97-100.
- Nikawa H, Hamada T, Yamashiro H, et al. A review of in vivo methods to evaluate the efficacy of denture cleansers. *Int J Prosthodontics* 1999;12: 153-159.
- Singh A, Verma R, Murari A, et al. Oral candidiasis: An overview. *J Oral Maxillofac Pathol* 2014;18: S81-S85.
- Gendreau L, Loewy ZG. Epidemiology and etiology of denture stomatitis. *J Prosthodont* 2011;20: 251-260.
- Ribeiro DG, Pavarina AC, Dovigo LN, et al. Prevalence of candida spp. associated with bacteria species on complete dentures. *Gerodontology* 2012;29: 203-208.
- Salerno C, Pascale M, Contaldo M, et al. Candida-associated denture stomatitis. *Med Oral Patol Oral Cir Bucal* 2011;16: 139-143.
- Pereira-Cenci T, Cury AADB, Crielaard W, et al. Development of candida-associated denture stomatitis: New insights. *J Appl Oral Sci* 2008;16: 86-94.
- Nishi Y, Seto K, Kamashita Y, et al. Examination of denture-cleaning methods based on the quantity of microorganisms adhering to a denture. *Gerodontology* 2012;9: e259-e266.
- Sari LORK. Utilization of traditional medicines with consideration of benefits and safety. *Majalah Ilmu Kefarmasian* 2006;3: 1-7. (In Indonesia)
- Taiga A, Friday E. Variations in phytochemical properties of selected fungicidal aqueous extracts of some plant leaves in Kogi State, Nigeria. *American-Eurasian. J Sustainable Agricul* 2019;3: 407-409.
- Fathiazad F, Delazar A, Amiri R, et al. Extraction of flavonoids and quantification of Rutin from Waste Tobacco leaves. *Iranian J Pharmaceutical Res* 2005;3: 222-227.



20. Anumudu C, Nwachukwu M, Obasi C, et al. Antimicrobial activities of extracts of tobacco leaf (*Nicotiana tabacum*) and its grounded snuff (utaba) on *Candida albicans* and *Streptococcus pyogenes*. *J Trop Dis* 2019;7: 2-8.
21. Sato S, Cavalcante MR, Orsi IA, et al. Assessment of flexural strength and color alteration of heat-polymerized acrylic resins after simulated use of denture cleansers. *Braz Dent J* 2005;16: 124-128.
22. De-Andrade IMH, Cruz PC, Silva-Lovato CH, et al. Effervescent tablets and ultrasonic devices against *Candida* and *Mutans streptococci* in denture biofilm. *Gerodontol* 2011;28: 264-270.
23. Arruda CNFDB, Sorgini VC, De-Oliveira AP, et al. Effects of denture cleansers on heat-polymerized acrylic resin: a five-year-simulated period of use. *Braz Dent J* 2015;26: 404-408.
24. Nwachukwu I. Antifungal activities and phytochemical constituents of *Nicotiana tabacum* leaf extracts on selected dermatophytes. *Nigerian J Microbiol* 2018;31: 3871-3875.
25. Ru QM, Wang LJ, Li WM, et al. In Vitro antioxidant properties of flavonoids and polysaccharides extract from tobacco (*Nicotiana tabacum* L.) leaves. *Molecules* 2012;17: 11281-11291.
26. Prasad NR, Viswanathan S, Devi JR, et al. Preliminary phytochemical screening and antimicrobial activity of *Samea saman*. *J Med Plants Res* 2008;2: 268-270.
27. Jaliyanto S, Khotimah, Raharjo W. Antifungal activity test of ethanol extract of *Lansium domesticum* (Lansium domesticum Corr.) against *Candida albicans* by In Vitro. *Acta Univ Agric Silvicult Mendel Brun* 2015;16: 39-40. (In Indonesia)
28. Khan MI, Abdulatef A, Jin HS, et al. Green tea seed isolated saponins exerts antibacterial effects against various strains of gram positive and gram-negative bacteria: a comprehensive study in vitro and in vivo. *Evidence-Based Complement Alt Med* 2018: 1-12.
29. Walls PLL, Bird JC, Bourouiba L. Moving with bubbles: A review of the interactions between bubbles and the microorganisms that surround them. *Integ Comp Biol* 2014;54: 1014-1025.
30. Sataphaty SR, Patra M, Patnaik M. Process and variation effervescent formulation review. *Innovat Int J Med Pharm Sci* 2016;1: 10.



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