Jurnal Keperawatan Global
Vol. 7, No. 1, June 2022
https://doi.org/10.37341/jkg.v0i0.440

Original Research

Using An Electrical Toothache Salvadora Perisca To Increasing Oral Health Quality: A Manikin Trial

Satino[1], Yuyun Setyorini[2], Rendi Editya Darmawan[3*]

[1,2,3] Depathment of Nursing, Poltekkes Kemenkes Surakarta

ABSTRACT

Background: *The most effective way of oral care in patients with decreased consciousness is not yet known. Electrical toothache salvadora perisca has the potential to improve oral hygiene because it has an antibiotic effect, and is easy to use. Aim of study is to know the effect of electrical toothache salvadora perisca on oral health quality.*

Methods: *A pre-experimental study in a laboratory using manikins in 2021. The study was conducted by 6 respondents in which each respondent performed 2 oral treatments using an electrical toothache salvadora perisca on the mouth of a manikin that had been dirty make-up using Ky Jelly. The toothbrush was operated for 1 minute evenly on the teeth, and foam sticks are used to clean the lips and oral mucosa. Oral hygiene was measured with a modified Beck Oral Assessment Scale (BOAS) instrument, and the scores of conditions before and after oral care were compared using the Wilcoxon test.*

Results: *Wilcoxon test showed a value of 0.002, which means that there was a difference in the BOAS score between before and after treatment. Electric toothbrushes clean teeth better, and foam sticks are able to clean the inside and soft of the patient's mouth.*

Conclusion: *Electrical toothache salvadora perisca can increasing oral health quality. The implication is need to find and try out the most effective way of doing oral care.*

ARTICLE HISTORY
Received : March 3th, 2022
Accepted: March 25th, 2022

KEYWORDS
electrical toothache, oral care, oral health, salvadora perisca, siwak;

CONTACT
Rendi Editya Darmawan
✉
rendiedityad@gmail.com
Poltekkes Kemenkes Surakarta, Jl. Letjen Sutoyo, Mojosongo, Surakarta, Jawa Tengah, Indonesia

Cite this as: Satino, S., Setyorini, Y., & Darmawan, R. (2022). Using An Electrical Toothache Salvadora Perisca To Increasing Oral Health Quality: A Manikin Trial. *(JKG) Jurnal Keperawatan Global*, 1-9. https://doi.org/10.37341/jkg.v0i0.440

INTRODUCTION

Patients in critical care and nervous system disorders tend to experience impaired oral hygiene. Oral cavity infections can be a potential source of infection that can lead to various systemic diseases, especially in patients with an endotracheal tube (ETT) in the Intensive Care Unit (ICU) (Anggraeni, Hayati, & Nur'aeni, 2020). The ETT in the mouth of an intubated patient can be the entrance and site for bacterial colonization that causes Ventilator Associated Pneumonia (VAP) which is one of the causes of patient death in the ICU (Cooper, 2021).

The endotracheal tube interferes with clearing mucus and the patient does not have a cough reflex so that microorganisms grow in the respiratory tract. The increased number of organisms in the respiratory tract can cause pneumonia, and lead to long treatment times and increased costs (Cooper, 2021; Zhao et al., 2020).

The Covid-19 pandemic has increased the incidence of patients entering the ICU and using ventilators. The results of the study by Modes et al., (2022) reported that of 339 patients treated in California, America in the period 21 December 202 = 27 January 2022, 9-13% of Covid-19 patients entered the ICU and used mechanical ventilation. Patients treated with mechanical ventilation in the first 48 hours may develop Ventilator Associated pneumonia (Cooper, 2021). Methods that can be used to prevent VAP are oral health care, such as brushing teeth, using mouthwash, swabs, and also suctioning mucus (Albabtain, Ibrahim, Bhangra, Rosengren, & Gustafsson, 2018; Azaripour et al., 2017).

Nurses as caregivers have an important role in providing oral care interventions to maintain oral health and prevent infection (Anggraeni et al., 2020). On the other hand, the level of knowledge of nurses and doctors regarding oral care to prevent bacterial colonization in the oral cavity and oropharynx is still low. The research of Sadli, Tavianto, & Redjeki, (2017) describes that only 38.6% of nurses and 13.9% of doctors know that oral care is carried out if needed. On the other hand, oral care serves to reduce the risk of VAP. It is necessary to increase knowledge of the importance of oral care and simple tools that can be applied properly in oral care.

Setianingsih, Riandhyanita, & Asyrofi, (2017) report that's on nurses at a hospital in Central Java reported that 60% of respondents performed oral hygiene in the poor category, and 40% in the good category. The lack of good oral hygiene for patients is influenced by the high workload of nurses compared to the number of patients, facilities in the implementation of oral hygiene are still inadequate, and nurses do not understand how to implement oral hygiene in accordance with standard operating procedures (Setianingsih et al., 2017).

The actions taken at this time to clean the patient's mouth are suction and Chlorhexidine (CHX). The report Zhao et al., (2020) stated that patients who brush their teeth have a lower risk of developing VAP, than those who do not brush their teeth. The report Albrecht et al., (2013) also shows that brushing teeth < 2 times a day causes Decayed, Missing, and Filled Teeth (DMFT)) and periodontal disease, and reduces a person's quality of life.

Oral hygiene care does not guarantee a person's oral health improves. The results of the research by Anggraeni et al., (2020) showed that the oral health status of intubated patients was getting worse, despite routine oral care interventions using chlorhexidine gluconate. Researchers recommend additional topical agents to keep mucous membranes moist, so that the oral health status of intubated patients will be better. The results of a literature study (Hua et al., 2016) stated that chlorhexidine mouthwash or gel reduced the risk of developing ventilator-associated pneumonia in critically ill patients from 25% to approximately 19%. There is no evidence that using an antiseptic or povidone-iodine mouthwash is more effective than saline or placebo. Saline rinses are more effective than saline swabs in reducing VAP (Hua et al., 2016).

Good oral care involves one comprehensive treatment including oral hydration, lip balm, and careful brushing of teeth to mechanically remove plaque. Eliminate interventions that cause harm and focus on interventions that improve oral health that are evidence-based (Cuthbertson & Dale, 2021). Toothpaste ingredients are vital and

keep teeth clean. Replacement of toothpaste with a siwak stick (Salvadora perisca) in some parts of the world is becoming popular. Siwak is one of the oldest oral hygiene tools in the world. The low price and easy availability are the reasons for replacing toothpaste with siwak (Albabtain et al., 2018; Ayoub et al., 2021). Siwak has strong antibacterial ability against gram-negative bacteria, and can prevent mild-to-moderate periodontitis (Albabtain et al., 2018).

In addition to toothpaste, the type of toothbrush is an important factor in the implementation of oral care. The results of the study show that using an electric toothbrush can speed up the teeth cleaning process compared to a manual toothbrush, although there is no difference in dental hygiene achieved (Petker-Jung, Weik, Margraf-Stiksrud, & Deinzer, 2022). Different study results were reported by Hua et al., (2016) who stated that there was insufficient evidence to determine whether powered toothbrushes were more effective in reducing VAP.

Many studies and actions have been carried out to find the most effective way to perform oral care, but none of the most effective ways have been found. Researchers combined salvadora perisca with an electric toothbrush and foam stick in performing oral care on manikins. The purpose of this study was to determine the effect of electrical toothache salvadora perisca on oral health quality.

MATERIALS AND METHOD

A pre experimental study, with oral care treatment using manikins. The research was conducted in March-December 2021, with 1 lecturer and 6 final year students as respondents who were selected by purposive sampling. The research was conducted at the Poltekkes laboratory of the Ministry of Health Surakarta.

Manikins were given KY Jelly as a substitute for 2 cm of dirt on the mouth and teeth and in the same position on the lips, gingival and oral mucosa, tongue, teeth, and saliva. KY Jelly is spread in the area of the teeth and the oral mucosa inside and outside. Evaluation of dental and oral hygiene was based on the cleanliness of KY Jelly on the teeth and mouth of the manikin. The treatment given was manikins by brushing with an electrical toothache salvadora perisca toothbrush (Figure 1), for 1 minute. This toothbrush is a modification of an electric toothbrush where researchers replace the toothbrush bristles with Siwak (Salvadora Perisca). The step is to put the toothbrush into the water in a glass, to soften the bristles of the toothbrush. Then the teeth are brushed all over the teeth. The toothbrush moves up and down when it is turned on.

Figure 1. Electrical Toothache Salvadora Perisca

After brushing the teeth, the researcher then cleaned the mouth and teeth using a foam stick (Figure 2). Foam sticks are made of foam glued to a flat wooden stick. Foam sticks consist of 2 shapes, the first is a rectangle and the second is a half oval. Retangel foam sticks are used for wide and easy-to-reach areas of the mouth, while half oval

foam sticks are used inside and narrowly. Each mouth cleaning session uses 1 foam stick each. Foam sticks are not reused, but only used once.

Figure 2. Foam sticks

Respondents totaling 6 people performed oral care 2 times each using the same procedure. The mouth of the manikin was given Ky Jelly with the same amount and location, then oral hygiene was measured by modifying the Beck Oral Assessment Scale (BOAS) instrument.

Table 1. Instrument Beck Oral Assessment Scale (BOAS) modified

Area	Score			
	1	2	3	4
Lips	Very clean	Clean	Fairly clean	Dirty
Gingival and oral mucosa	Very clean	Clean	Fairly clean	Dirty
Tongue	Very clean	Clean	Fairly clean	Dirty
Teeth	Very clean	Clean	Fairly clean	Dirty
Saliva	Very clean	Clean	Fairly clean	Dirty

The score is divided into 4 levels, namely very clean (1), clean (2), fairly clean (3), and dirty (4). Then the scores are summed and interpreted as follows:

- BOAS I (0-5) : Very good
- BOAS II (6-10) : Good
- BOAS III (11-15) : Enough Good
- BOAS IV (16-20) : Not Good

Researchers looked at the cleanliness of the areas of the lips, gingival and oral mucosa, tongue, teeth, and saliva (Gupta, Gupta, Singh, & Saxsena, 2016) before and after oral care using electrical toothache salvadora perisca. Analysis of the data to compare the 12 actions taken is the Wilcoxon test. The Ethical Approval was obtained from Health Research Ethics Committee of Poltekkes Kemenkes Surakarta, numbered LB.02.02/1.1/2424.4A/2021 dated on January 31st, 2021.

RESULTS

The results showed that the Beck Oral Assessment Scale (BOAS) after oral treatment was:

Table 2. Beck Oral Assessment Scale (BOAS) Score by Area

Area	Beck Oral Assessment Scale (BOAS) Score				
	Before Oral Care	After Oral Care			
	Dirty	Very clean	Clean	Fairly clean	Dirty
Lips	12 (100%)	10 (83%)	2 (17%)	0	0
Gingival and oral mucosa	12 (100%)	9 (75%)	3 (25%)	0	0
Tongue	12 (100%)	9 (75%)	3 (25%)	0	0
Teeth	12 (100%)	10 (83%)	2 (17%)	0	0
Saliva	12 (100%)	8 (67%)	5 (33%)	0	0

The state of oral health in pantom was made dirty with a value of 4 in all areas. After 12 treatments with 6 different people, the overall results of pantom oral health were clean and very clean. Lip area 83% at very clean level, and 17% at clean level. Gingival and oral mucosa as much as 75% at very clean level, and 25% at clean level. Tongue is 75% at very clean level, and 25% at clean level. Teeth lips 83% at a very clean level, and 17% at a clean level. Saliva lips 67% at very clean level, and 33% at clean level.

Table 3. Beck Oral Assessment Scale (BOAS) Score

BOAS Score	Before Oral Care	After Oral Care
Eksperiment 1	20	6
Eksperiment 2	20	6
Eksperiment 3	20	5
Eksperiment 4	20	6
Eksperiment 5	20	5
Eksperiment 6	20	5
Eksperiment 7	20	7
Eksperiment 8	20	8
Eksperiment 9	20	7
Eksperiment 10	20	7
Eksperiment 11	20	7
Eksperiment 12	20	6
Means (X)	**20**	**6.25**

The average Beck Oral Assessment Scale (BOAS) Score before treatment was 20, while after treatment was 6.25. The fact also shows that all trials resulted in lower BOAS scores than before the experiment. It can be concluded that oral care using electrical toothache salvadora perisca can reduce the BOAS score.

Table 4. Interpretation of the Beck Oral Assessment Scale (BOAS) Score

Var	BOAS Score			
	BOAS I	**BOAS II**	**BOAS III**	**BOAS IV**
Before Oral Care	0	0	0	12 (100%)
After Oral Care	3 (25%)	9 (75%)	0	0
P 0.002				

The BOAS score before treatment was 100% at level 4, while after treatment, the BOAS score was at 25% BOAS I and 75% BOAS II. The results of the Wilcoxon test showed a value of 0.002, which means that there was a difference in the BOAS score between before and after treatment.

DISCUSSION

Oral health is not only the area of the teeth, but includes the gingiva, lips, lips, saliva and chewing ability (Wood, 2017). The oral mucosa is the first place for microbes, antigens, allergens and food to enter the digestive tract (Moutsopoulos & Konkel, 2018). For this reason, oral hygiene can affect the patient's general health.

The results show that the lips area is 83% at the very clean level, and 17% at the clean level. Gingival and oral mucosa as much as 75% at very clean level, and 25% at clean level. Tongue is 75% at very clean level, and 25% at clean level. Teeth lips 83% at a very clean level, and 17% at a clean level. Saliva lips 67% at very clean level, and 33% at clean level.

This result is in line with the report Estaji, Alinejad, Hassan Rakhshani, & Rad, (2015) reported that the use of a toothbrush had a significant impact on the reduction of oral lesions in the patient's mouth. Electric toothbrushes are more effective at reducing dental plaque, gingivitis, and bleeding compared to manual toothbrushes (Wang et al., 2020). Although it was reported that only 41% of nurses used a toothbrush to treat the patient's mouth, the benefits of a toothbrush in eliminating microorganisms in the mouth were proven to be effective (Estaji et al., 2015; Wang et al., 2020).

Oral care needs to take into account the patient's risk, and the patient's ability to maintain oral health (Labeau, Conoscenti, & Blot, 2021). Although systematic oral care did not significantly reduce the incidence of ventilator-associated pneumonia in critically ill patients, it did significantly improve oral health and mucosal plaque index (Haghighi, Shafipour, Bagheri-Nesami, Gholipour Baradari, & Yazdani Charati, 2017). Integrated and collaborative actions in performing oral care need to be mobilized, maintained, and strengthened to address advanced diseases resulting from poor oral health (Wood, 2017). Report from Kitamoto et al., (2020) stated that periodontal inflammation exacerbates intestinal inflammation. Periodontitis causes the development of klebsiella and Enterobacter in the oral cavity, which is then ingested and transferred to the intestine. Pathogens that migrate to the intestines cause intestinal inflammation.

Oral care has been using chlorhexidine, and applying the material into the mouth of critically ill patients means solving the patient's problems. The investigators recommend the potential toxic effects of oral chlorhexidine mouthwash on mucosal lesions, acute pulmonary syndrome, and increased mortality (Kitamoto et al., 2020). One way to replace chlorhexidine is to use miswak. In addition to improving oral health in critically ill patients, miswak can reduce the risk of VAP.

Low cost, and fewer side effects than chlorhexidine make it recommended for use in critically ill patients (Irani, Sargazi, Dahmardeh, & Pishkar Mofrad, 2020). The

content of lavonoids, glycosides, sterols, terpenes, carbohydrates and alkaloids in miswak can act as antimicrobial, antioxidant, analgesic, anthelmintic, anti-inflammatory, antiulcer, sedative, anticonvulsant, antiosteoporosis, antidiabetic, and hypolipidemic (Farag, Abdel-Mageed, El Gamal, & Basudan, 2021).

CONCLUSION

The results showed that there was a difference in BOAS scores between before and after oral health treatment using electrical toothache salvadora perisca. Electric toothbrushes clean teeth better, and foam sticks are able to clean the inside and soft of the patient's mouth. Further experiments are needed to see the risk of thrush in pantoms, seeing that salvadora perisca has a rough structure.

We suggest doing some comparisons of the effectiveness between the use of chlorhexidine, toothpaste, cleaning without mouthwash, and other oral health products, so that it can be seen the most effective way to improve oral health on the patient.

REFERENCES

Albabtain, R., Ibrahim, L., Bhangra, S., Rosengren, A., & Gustafsson, A. (2018). Chemical effects of chewing sticks made of Salvadora persica. *International Journal of Dental Hygiene*, *16*(4), 535–540. https://doi.org/10.1111/idh.12359

Albrecht, M., Kupfer, R., Reissmann, D., Haastert, B., Mühlhauser, I., & Köpke, S. (2013). Oral health educational interventions for nursing home staff and residents. *Cochrane Database of Systematic Reviews*, *2013*(5). https://doi.org/10.1002/14651858.CD010535

Anggraeni, D. T., Hayati, A. T., & Nur'aeni, A. (2020). The Effect of Oral Care Intervention on Oral Health Status of Intubated Patients in the Intensive Care Unit. *Belitung Nursing Journal*, *6*(1), 21–26. https://doi.org/10.33546/BNJ.971

Ayoub, N., Badr, N., Al-Ghamdi, S. S., Alzahrani, A., Alsulaimani, R., Nassar, A., … Swilam, N. (2021). GC/MS Profiling and Ex Vivo Antibacterial Activity of Salvadora persica (Siwak) against Enterococcus faecalis as Intracanal Medicament. *Evidence-Based Complementary and Alternative Medicine*, *2021*, 1–8. https://doi.org/10.1155/2021/6333867

Azaripour, A., Mahmoodi, B., Habibi, E., Willershausen, I., Schmidtmann, I., & Willershausen, B. (2017). Effectiveness of a miswak extract-containing toothpaste on gingival inflammation: a randomized clinical trial. *International Journal of Dental Hygiene*, *15*(3), 195–202. https://doi.org/10.1111/idh.12195

Cooper, A. S. (2021). Cochrane Review Summary Oral Hygiene Care to Prevent Critically Ill Patients Relevance to Critical Care Nursing. *American Association of Critical Care Nurses*, *41*(4), 80–82.

Cuthbertson, B. H., & Dale, C. M. (2021). Less daily oral hygiene is more in the ICU: yes. *Intensive Care Medicine*, *47*(3), 328–330. https://doi.org/10.1007/s00134-020-06261-6

Estaji, Z., Alinejad, M., Hassan Rakhshani, M., & Rad, M. (2015). The Comparison of Chlorhexidine Solution and Swab With Toothbrush and Toothpaste Effect on Preventing Oral Lesions in Hospitalized Patients in Intensive Care Unit. *Global Journal of Health Science*, *8*(5), 211–216. https://doi.org/10.5539/gjhs.v8n5p211

Farag, M., Abdel-Mageed, W. M., El Gamal, A. A., & Basudan, O. A. (2021). Salvadora persica L.: Toothbrush tree with health benefits and industrial applications – An updated evidence-based review. *Saudi Pharmaceutical Journal*, *29*(7), 751–763. https://doi.org/10.1016/j.jsps.2021.05.007

Gupta, A., Gupta, A., Singh, T., & Saxsena, A. (2016). Role of oral care to prevent VAP in mechanically ventilated Intensive Care Unit patients. *Saudi Journal of Anaesthesia*, *10*(1), 95–97. https://doi.org/10.4103/1658-354X.169484

Haghighi, A., Shafipour, V., Bagheri-Nesami, M., Gholipour Baradari, A., & Yazdani Charati, J. (2017). The impact of oral care on oral health status and prevention of ventilator-associated pneumonia in critically ill patients. *Australian Critical Care*, *30*(2), 69–73. https://doi.org/10.1016/j.aucc.2016.07.002

Hua, F., Xie, H., Worthington, H. V, Furness, S., Zhang, Q., & Li, C. (2016). Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *The Cochrane Database of Systematic Reviews*, *10*(10), CD008367. https://doi.org/10.1002/14651858.CD008367.pub3

Irani, H., Sargazi, G., Dahmardeh, A. R., & Pishkar Mofrad, Z. (2020). The Effect of Oral Care with Miswak Versus Chlorhexidine on the Incidence of Ventilator-Associated Pneumonia: A Clinical Trial Study. *Medical - Surgical Nursing Journal*, *8*(4), 1–7. https://doi.org/10.5812/msnj.100387

Kitamoto, S., Nagao-Kitamoto, H., Jiao, Y., Gillilland, M. G., Hayashi, A., Imai, J., … Kamada, N. (2020). The Intermucosal Connection between the Mouth and Gut in Commensal Pathobiont-Driven Colitis. *Cell*, *182*(2), 447-462.e14. https://doi.org/10.1016/j.cell.2020.05.048

Labeau, S. O., Conoscenti, E., & Blot, S. I. (2021). Less daily oral hygiene is more in the ICU: not sure. *Intensive Care Medicine*, *47*(3), 334–336. https://doi.org/10.1007/s00134-020-06021-6

Modes, M. E., Directo, M. P., Melgar, M., Johnson, L. R., Yang, H., Chaudhary, P., … Chen, P. (2022). Clinical Characteristics and Outcomes Among Adults Hospitalized with Laboratory-Confirmed SARS-CoV-2 Infection During Periods of B.1.617.2 (Delta) and B.1.1.529 (Omicron) Variant Predominance — One Hospital, California, July 15–September 23, 2021, and Dec. *MMWR Recommendations and Reports*, *71*(6), 217–223. https://doi.org/10.15585/mmwr.mm7106e2

Moutsopoulos, N. M., & Konkel, J. E. (2018). Tissue-Specific Immunity at the Oral Mucosal Barrier. *Trends in Immunology*, *39*(4), 276–287.

https://doi.org/10.1016/j.it.2017.08.005

Petker-Jung, W., Weik, U., Margraf-Stiksrud, J., & Deinzer, R. (2022). What characterizes effective tooth brushing of daily users of powered versus manual toothbrushes? *BMC Oral Health*, *22*(1), 1–9. https://doi.org/10.1186/s12903-022-02045-0

Sadli, M. F., Tavianto, D., & Redjeki, I. S. (2017). Gambaran Pengetahuan Klinisi Ruang Rawat Intensif mengenai Ventilator Associated Pneumonia (VAP) Bundle di Ruang Rawat Intensif RSUP Dr. Hasan Sadikin Bandung. *Jurnal Anestesi Perioperatif*, *5*(2), 85. https://doi.org/10.15851/jap.v5n2.1108

Setianingsih, Riandhyanita, F., & Asyrofi, A. (2017). Gambaran Pelaksanaan Tindakan Pral Hygiene Pada Pasien di Ruang Intensive Care Unit (ICU). *Jurnal Perawat Indonesia*, *1*(2), 48–53.

Wang, P., Xu, Y., Zhang, J., Chen, X., Liang, W., Liu, X., … Xie, H. (2020). Comparison of the effectiveness between power toothbrushes and manual toothbrushes for oral health: a systematic review and meta-analysis. *Acta Odontologica Scandinavica*, *78*(4). https://doi.org/https://doi.org/10.1080/00016357.2019.1697826

Wood, D. J. (2017). Dental Journal. *Smile Dental Journal*, *5*(2), 81–83.

Zhao, T., Wu, X., Zhang, Q., Li, C., Worthington, H. V., & Hua, F. (2020). Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *Cochrane Database of Systematic Reviews*, *2020*(12). https://doi.org/10.1002/14651858.CD008367.pub4