

Research paper

Effects of aroma mouthwash on stress level, xerostomia, and halitosis in healthy nurses: A non-randomized controlled clinical trial

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Abstract

Introduction: Stress may increase halitosis. As aromatherapy is known to reduce stress, this study aimed to investigate the effects of aroma mouthwash using peppermint, lemon, tea tree, and ylang ylang oil on stress level, xerostomia, halitosis, and salivary pH of nurses.

Methods: One hundred twenty nurses were allocated to one of three groups, aroma gargling ($N=40$), saline gargling ($N=40$) or no-treatment ($N=40$). The aromatic gargle solution was blended by a certified aromatherapist and researcher. Peppermint (*Mentha piperita*), lemon (*Citrus limon*), tea tree (*Melaleuca alternifolia*), and ylang ylang (*Cananga odorata*) were mixed in 1:1:2:1 ratios. For gargling, the nurses who consented to participate in the study used 15–30 cm³ of the blended aromatic gargle solution 3 times every day. The time spent on gargling was about 10–15 s each time.

Results: The perceived stress in the aroma gargling group lowered significantly compared with control group and saline group at 10 ($p<.001$) and 30 min ($p<.001$). Xerostomia in the aroma group decreased significantly compared with the saline solution and control groups after the treatment ($p<.001$). Aroma gargling reduced objective halitosis ($p<.001$ after 10 min; $p<.001$ after 30 min). Salivary pH in the aroma group significantly increased compared with control and saline group ($p<.001$ after 10 min; $p<.001$ after 30 min).

Conclusion: The aroma gargle was an effective intervention for relieving stress of the nurses, decreasing xerostomia, and reducing objective halitosis. Using an aroma gargle may enhance the quality of life of nurses.

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Keywords: Aromatherapy; Gargling; Mouthwash; Stress; Halitosis; Non-randomised controlled trial

1. Introduction

Nurses, as medical professionals, should not only provide high-quality nursing services, but also satisfy healthcare consumers' demands in order to meet health needs. However, nurses due to insufficient nursing manpower, heavy workload, and change of work shifts, it is difficult for them to take time off. It is therefore important for them to acquire self-help approaches and techniques which can ameliorate stress and its sequela.

Especially, juggling pregnancy and childcare within shift work adds even more stress [1]. Symptoms of stress in nurses appear to be higher than the average worker, and interventions to manage such symptoms in clinical nurses should be a priority [2]. If prolonged stress is not addressed, it will have physical and psychological effects and impact on quality of life and well-being. As well as increasing susceptibility to illness it may also impact on the quality of patient care by potentially affecting task efficiency and work motivation [3,4].

Generally, stress may induce physiological changes to body functions such as the nervous system, endocrine system, immune system, etc. [5], and may affect oral health and bad breath [6,7]. Studies on the relationship between stress and diseases in the oral area show that there is a correlation between stress and various symptoms and signs such as dry mouth, bad breath,

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other intra-oral diseases, etc [8–10]. Subjective xerostomia is related to psychological factors [6], and stress-related medical history is observed mostly in those who experience oral dryness [11]. Stress reduces the salivary flow rate and increases the concentration of volatile sulfur compounds that result in halitosis [7,12,13]. The salivary flow rate and pH are closely related to bad breath: As the salivary flow amount decreases, the density of microorganisms in the saliva increases, leading to a reduction in deglutition movements which means the contact time of microorganisms on the tongue and sulfur-containing substances in the saliva is longer [14]. Also, the lower the salivary pH, the more halitosis [15].

Halitosis, an unpleasant odor present on the exhaled breath, greatly affects one's social life. Besides, it makes nurses, who deal with many patients and medical professionals, feel discouraged psychologically and may cause others as well as the nurses themselves feel uncomfortable. Furthermore, if one has bad breath, they cannot talk with others confidently and convey everything he/she needs to say because they worry that their bad breath might make others feel unpleasant. Consequently, it is likely that people who have many interpersonal relations have a problem with social life [16].

For nurses, stress may induce saliva secretion to decrease and halitosis to increase. Since bad breath can make nurses themselves and others feel uncomfortable and embarrassed, and active intervention to reduce halitosis is crucial. Complementary and alternative therapies are used more and more to relieve stress. Therapies include music, meditation, exercise, dietary therapy, etc., and the scope is wide. Among them, aromatherapy, a type of treatment that has almost no side effects, helps maintain physical, mental and psychological health and promotes energy, using aromatic compounds extracted from plants [17,18]. The experimental treatment in this study was to let them gargle with aroma gargling solution blended by certified aromatherapist. Aroma gargling solution was blended with peppermint (*Mentha piperita*) as a refreshing essential oil, lemon (*Citrus limon*) as an antimicrobial oil, tea tree (*Melaleuca alternifolia*) as an antibacterial oil and ylang-ylang (*Cananga odorata*) as a stress reduction oil [18]. Moreover, research recognizes that it demonstrates treatment effects such as anti-bacterial and anti-microbial effects, wound healing, immune-boosting effects, anti-depression and soothing effects, etc. depending on the characteristics of oils [17,18]. In particular, an oral rinse made with aroma oils has antioxidant, anti-inflammatory, and anti-microbial effects, so it is effective in alleviating halitosis in average people [19], critical patients [20], and fasting patients [21–24]. Additionally, when manuka and kanuka, among aromatherapy essential oils, were used, they had a positive effect on stomatitis induced by radiation therapy [25].

Research about the use of aromatherapy to release stress show that aroma inhalation has a positive effect on stress of healthy adults [26–28], and studies for which nurses were selected as subjects also have found that aroma inhalation and massage are effective in relieving stress [29,30]. Therefore, aromatherapy essential oils may be effective in reducing bad breath and stress.

For that reason, this study aimed to verify the effects of aromatherapy by using it in order to achieve both effects reducing xerostomia and halitosis on top of relieving stress. Specifically, using aromatic gargle solutions among the methods of using aromatherapy is a good way for consumers to use it on their own as an effective approach to reducing halitosis. An aromatherapy textbook was used to identify which oils were appropriate and peppermint, spearmint, rosemary, lemon, mandarin were chosen to rinse mouth to achieve fresher breath [31]. Therefore, this study used aromatherapy as a way of relieving stress in nurses, by using and an aromatic gargle solution was applied among others. In particular, stress is one of the factors that causes xerostomia, which then induces halitosis by decreasing the salivary flow rate. Therefore, xerostomia, halitosis and salivary pH were compared as well as stress of nurses in this study in order to verify the effects of aromatherapy.

Therefore, this study attempted to compare the use of an aromatic gargle as intervention to reduce stress and halitosis in nursing staff with saline gargle or no treatment,

2. Participants and methods

2.1. Study design

This study was a non-randomized controlled trial. Aromatherapy gargling solution was used by the experimental group, saline was used for the placebo group, and no treatment was given to the control group. Stress, xerostomia, halitosis, and salivary pH were measured as the outcome variables to confirm the effect of experimental treatment.

2.2. Participants

The study subjects were nurses working for the Eulji University Hospital in the Daejeon city. According to the inclusion criteria, this study selected dayshift nurses who worked in the ICU, understood the purpose of this study, provided a written consent to participating in the study by a research assistant, and had no contraindications for aromatherapy. The exclusion criteria in this study were pregnancy and allergy to aroma essential oils.

The study protocol was reviewed and approved by the Institutional Review Board of the Eulji University Hospital that the investigator belonged to (11-089). The study commenced after participants had provided their written consent. An ID number was allocated to each participant to ensure anonymity and to conform with data protection.

2.3. Intervention

The experimental treatments in this study were blending aromatherapy essential oils and applying the diluted solution by gargling. The used aroma products and solubilizer were manufactured by Neumond (Germany) and Dr. Wendy Maddocks-Jennings, Natural Products New Zealand (New Zealand). The aromatic gargle solution was blended by a researcher who was a certified aromatherapist, mixing

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