Dental Journal
Majalah Kedokteran Gigi

Dental Journal
(Majalah Kedokteran Gigi)
2015 September; 48(3): 109–112

Research Report

Xerostomia severity difference between elderly using alcohol and non alcohol-containing mouthwash

Hendri Susanto
Department of Oral Medicine
Faculty of Dentistry, Universitas Gadjah Mada
Yogyakarta - Indonesia

ABSTRACT

Background: *There are alcohol and non alcohol-containing mouthwash available in the market. Alcohol-containing mouthwash may have side effects which induced by alcohol in the mouthwash. Dry mouth/xerostomia may be a potential side effect of alcohol-containing mouthwash when used by elderly person who has a tendency to have dry mouth. The evidence of xerostomia induced by alcohol-containing mouthwash used by elderly is not available yet.* ***Purpose:*** *The aim of this study is to know the differences of xerostomia severity between elderly use alcohol-containing mouthwash and non alcohol-containing mouthwash.* ***Method:*** *This study was performed in elderly with age above sixty who do not have systemic diseases based on anamnesis, do not have oral diseases, and do not have allergy to one of mouthwash components, do not use denture. Of total, thirty elderly participated in this study. The first group consists of elderly who use alcohol-containing mouthwash (AM) and the second group consists of elderly who use non alcohol-containing mouthwash (NAM). Both groups use mouthwash for seven days (one week) twice a day. Xerostomia severity was assessed by VAS questionnaire. The mean score of the visual analogue score (VAS) xerostomia each group in day one (baseline) and day eight (post treatment) was analyzed by the Wilcoxon sign ranked test and Mann Whitney U test with 95% confidence level.* ***Result:*** *the VAS score of xerostomia post treatment (mean+SD/19.47+8.33) higher than baseline (mean+SD/15.87+8.91) in AM group ($p<0.05$), but, there is no significant difference of VAS score of xersotomia between post treatment (mean+SD/23.53+10.81) and baseline (mean+SD/23.67+11.82) in NAM group ($p>0.05$). The mean difference of VAS score of post-treatment and baseline between AM and NAM group was not significant ($p>0.05$).* ***Conclusion:*** *The conclusion is no significance difference of xerostomia severity between alcohol-containing mouthwash and non alcohol-containing mouthwash in elderly.*

Keywords: *alcohol-containing mouthwash; elderly; non alcohol-containing mouthwash; xerostomia severity*

Correspondence: Hendri Susanto, c/o: Bagian Ilmu Penyakit Mulut, Fakultas Kedokteran Gigi Universitas Gadjah Mada. Jl. Denta Sekip Utara no. 1 Yogyakarta 55281, Indonesia. E-mail: drghendri@ugm.ac.id. Telp: +62274515307

INTRODUCTION

It has been known that mouthwash was recommended as additional routine oral health care after toothbrush. People like to use mouthwash because the advantages of mouthwash can reach all surfaces of the oral cavity which may not be achieved by a toothbrush and used mouthwash used within a short time. The campaign through the media, the availability of products of various brands and the content of mouthwash in stores or supermarkets, make people easier to choose mouthwash for maintaining oral health. Sometimes, people use mouthwash excessively and do not use it according to the indications or suggested manufacturer's instructions.[1] There are two types of mouthwash available in the market today, alcohol-containing mouthwash and non alcohol-containing mouthwash. Basically, both types of mouthwash use for oral antiseptic and may have similar indications such as for reducing dental plaque, relieve inflammation of the periodontal tissues, especially gingivitis, reducing halitosis and also to prevent caries due the presence of the fluoride content in the mouthwash.[2,3] The concentration of alcohol mouthwashes are commonly up to 21.6% with

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 56/DIKTI/Kep./2012.

DOI: 10.20473/j.djmkg.v48.i3.p109-112

the main content of essential oils. The alcohol-containing mouthwashes are available globally over the world. The containing of alcohol in mouthwash more than 10% has been suggested may cause discomfort in the oral cavity.[4,5] Although it is still controversial, the alcohol in mouthwash may be a risk factor for oral cancer.[6,7] In addition, some evidence suggests that the use of alcohol in the mouthwash may cause complaints of dry mouth (xerostomia).[6,8] Whether the evidence of alcohol-containing mouthwash may give serious side effects in oral cavity or not, a nonalcohol-containing mouthwash has been developed. Some products of non alcohol mouthwash have been already available in the market in Indonesia.[2,9]

A study of Kerr *et al*.[10] showed that there is no difference of xerostomia and salivary secretion significantly between groups of adult subjects who use mouthwash containing alcohol (Listerine) and non alcohol mouthwash (mint act). The study was conducted in adult subjects (mean age 40 years) with healthy and do not have systemic diseases, but, the mouthwash (mint Act) used in that study was not available in Indonesia. It is important to know the effect of alcohol containing mouthwash on xerostomia in elderly because there is not a study of the difference of xerostomia using mouthwash containing alcohol and non alcohol in the elderly yet since the pupulation of elderly relatively increased in Indonesia. It is suggested that the decreased salivary secretion and xerostomia found in the elderly, although aging as a cause of the decreased salivary secretion and xerostomia in the elderly is still debated.[11] Most causes of decreased salivary secretion and xerostomia in the elderly are mainly by systemic diseases and drugs.[12,13] Xerostomia and decreased salivary flow rate (hyposalivation) are not similar. Hyposalivation may cause xerostomia if the saliva production less than half of normal saliva production and xersotomia may be the first symptoms which will be found and told by patients in the clinic because the hyposalivation may be only assessed by salivary flow rate examination.[14] The use of mouthwash may affect oral condition, and xersotomia may be the complaint of subjetcs who used mouthwash. Alcohol-containing mouthwash may increase xerostomia severity in elderly. The aim of this study is to investigate the difference of xerostomia severity between elderly use non-alcohol mouthwash and alcohol mouthwash.

MATERIAL AND METHODS

This study was a pre-post study and performed in elderly who live in Yogyakarta, Indonesia. The inclusion criteria of this study is man or woman with age above 60 years old who do not have systemic diseases based on anamnesis such as diabetes mellitus (DM) etc, do not have acute oral diseases, and do not have allergy to one of mouthwash components, do not use denture, at least have four teeth in the mouth. Only subjects who meet the inclusion criteria and sign the informed consent involve in this study. The exclusion criteria of this study are elderly who have motoric control problem, under dentist or physician treatment, have acute oral problems and refuse to involve in this study. This study divided into two groups. The first group consist elderly who use alcohol-containing mouthwash (Listerie coll mint™) and the second group consists of elderly who use non alcohol-containing mouthwash (Hexadol™). All subjects do not know the mouthwash they received to use in this study. Both groups use mouthwash for 7 days (one week) twice a day with each rinse 15 ml (30 ml for a day). Before using mothwash (baseline), xerostomia severity was assessed by VAS questionnaire[15] and xerostomia severity reevaluate in day eight after routinely use mouthwash for seven days (post-treatment). The xersotomia severity assessed in the morning between 9.00-11.00 AM. The mean score of the visual analogue score (VAS) xerostomia each group in baseline and post-treatment was analyzed by the Wilcoxon sign ranked test, and Mann Whitney U test with 95% confidence level using SPSS 16.0 statistical program (SPSS Incorporation, Chicago, USA). This study approved by Ethical Committee of Faculty of Dentistry, Universitas Gadjah Mada.

RESULTS

There were 30 volunteer elderly who meet inclusion criteria participated in this study. Fifteen elderly in the first group used non alcohol mouthwash and the other fifteen elderly in the second group used alcohol-containing mouthwash. The characteristic of subjects of this study present in Table 1.

The mean ages of subjects in non alcohol mouthwash (NAM) was 67 year old, and the mean age in alcohol mouthwash (AM) was 66 year old. Female subjects were less in NAM (40%) than 53% female in AM group. All subjects in both group was retired and 100 % education level is middle education level graduate. Almost all subjects were Javanese.

The VAS score of xerostomia post treatment (mean+SD/19.47+8.33) higher than baseline (mean+SD/15.87+8.91) in AM group ($p<0.05$), but, there is no significant difference of VAS score of xersotomia between post treatment (mean+SD/23.53+10.81) and baseline (mean+SD/23.67+11.82) in NAM group ($p>0.05$). The mean difference of VAS score of post-treatment and baseline between AM and NAM group was not significant ($p>0.05$).

DISCUSSION

This study is the first study which comparing xerostomia severity between elderly using non alcohol-containing mouthwash and alcohol-containing mouthwash in Indonesia. This study showed the increase of xerostomia severity of elderly who used alcohol-containing mouthwash

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 56/DIKTI/Kep./2012.

DOI: 10.20473/j.djmkg.v48.i3.p109-112

Table 1. Demography of study subjects

Variable	Elderly with non-alcohol mouthwash/NAM (Hexadol)	Elderly with alcohol mouthwash/AM (Listerine cool mint)
N	15	15
sex : n (%)		
female	6 (40)	8 (53)
male	9 (60)	7 (47)
ages : mean (SD)	67.93 (4.95)	66.80 (44.04)
Education level : n (%)		
middle (junior & High School)	100%	100%
ethnicity: n (%)		
Javanese	93%	100%

n : number; SD : standard deviation

Table 2. Comparison of xerostomia severity between non-alcohol mouthwash (NAM) and alcohol mouthwash (AM)

Group	Treatment	VAS score Mean (SD)	p|	VAS score Mean (SD) diffference	p#
Non-alcohol mouthwash (Hexadol)	baseline	23.67 (11.82)			
	post therapy	23.53 (10.81)	>0.05	-0.13 (5.05)	
					>0.05
Alcohol-mouthwash (Listerine cool mint)	baseline	15.87 (8.91)		3.60 (4.64)	
	post therapy	19.47 (8.33)	<0.05		

SD : standard deviation; p : significance with p<0.05;
| : Wilcoxon sign rank t test; # Mann whitney U test between mean difference post treatment and baseline

was higher than non alcohol-containing mouthwash which indicated by the high VAS score after seven days using mouthwash. On the contrary, the difference of VAS score of xerostomia severity of elderly who used non alcohol-containing mouthwash between baseline and post treatment were relatively similar (Table 2). However the mean VAS scores of xerostomia in both pre and post treament in alcohol containing mouthwash subjetc were lower than the mean VAS scores of xerostomia in non alcohol-containing mouthwash. This difference of mean score of VAS in both groups may be caused by the effect of the other contents of alcohol-containing mouthwash (Listerine) such as the essential oils which may mask dry sensation of alcohol in mouthwash in oral cavity. According to analysis, there was a significance differences of VAS score of xerostomia between baseline (before using mouthwash) and post treatment (after using mouth for seven days) in elderly using alcohol mouthwash but there is no significant difference of VAS score in non- alcohol mouthwash group between baseline and post-treatment (p<0.05).

This study only assessed subjective feeling of xerostomia due the xerostomia may have more clinical relevance to assess salivary gland dysfunction or impairment rather than objective measurement using salivary flow rate. The measurement of salivary flow rate also tends to be influenced by the collection time of salivary flow rate and circadian rhythm.[16] This result showed that there is no significant difference between mean difference of pre and post of alcohol-containing mouthwash and non alcohol-containing mouthwash. This result was in line with Kerr *et al*.[17] study that showed there was not a significant difference of xerostomia between non alcohol-containing mouthwash and alcohol-containing mouthwash (Table 2). We used the same alcohol-containing mouthwash (Listerine) with alcohol concentration approximately to 21.6% as Kerr *et al.* study.[17] The difference between this study and Kerr et al study were the non alcohol-containing mouthwash and the method of study. Our study used Hexadol (Hexetidine 0.1%) which is one of non alcohol-containing mouthwashes available in market in Indonesia and the study of Kerr *et al*.,[17] use min act Total Care mouthwash. Hexetidine has been proved having an ability to inhibit of dental plaque attachment, and treat oral ulcers like the aphthous stomatitis. However, hexetidine with concentrations exceeding 0.1% may cause ulcers in the oral mucosa and erosion of the enamel.[18] The duration of mouthwash used by elderly is the consideration in our study method, since the elderly were vulnerable person, so we performed in elderly only in seven days using mouthwash. Besides, there is a possibility that topical adverse side effect of alcohol-containing mouthwash to oral tissue in elderly.[7]

Xerostomia does not always correlate with decrease salivary flow rate, People with xerostomia may not have salivary secretion impairment or in other way people with decreased salivary flow rate may not have xerostomia feeling.[19] Although aging may alter salivary gland tissue

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 56/DIKTI/Kep./2012.

DOI: 10.20473/j.djmkg.v48.i3.p109-112

by replacing acinar cell by fibrous and adipose tissue, but there is not an agreement yet that aging may independent factor which may cause decreased salivary flow rate (hyposalivation). Salivary flow rate were reduced with the increase age.[20] Most elderly may have low salivary flow rate because of multi factorial. The most factors that may cause xerostomia in elderly are medications and systemic diseases.[11,21]

In regard of the method which only a cross sectional study, this study showed that the alcohol may increase xersotomia severity in elderly, so, it did not showed cause and effect relationship. We use VAS questionnaire to assess the severity of xerostomia. This VAS quetioonaire has been used in our previous study which show the xerostomia severity correlate with serum inflammatory marker c-reactive protein (CRP) in Indonesian type 2 DM patient. The exact mechanism of xerostomia induced by alcohol containing mouthwash is still not available. Alcohol may constrict small blood vessel in minor salivary glands in oral mucosal. The constriction of small blood vessel will reduce only 7-8% salivary flow rate of total flow rate because there are aprooximatley 600-1000 minor salivary glands in oral mucosa which depends on vascularization.[22] The xerostomia may present if only hyposalivation under 50% of normal saliva productions.[23] The probably explanation of the local effect of alcohol in oral mucosa that could apply for our current study that the alcohol may cause dehydration effects of oral mucosal through transdermal/ transmucosal water loss.[4] Alcohol in mouthwash may induce the contristion of minor salivary glands and activation of vannilloid receptor-1 which result in hydration of oral mucosal.[24] This xerostomia effect of alcohol containing mouthwash may be temporary and it is a dose-response association. It means that the xerostomia effects of alcohol mouthwash will not longer when the alcohol containing mouthwash used in short periods and low dosage. In conclusion, there was not a significant difference of xerostomia severity between elderly used non alcohol-containing mouthwash and alcohol-containing mouthwash.

ACKNOWLEDGEMENT

This study was funded by Faculty of Dentistry, Universitas Gadjah Mada Yogyakarta, Indonesia.

REFERENCES

1. Asadoorian J. CDHA position paper on commercially available over the counter oral rinsing products. CJDH 2006; 40(4): 1-13.
2. Lemos CA, Villoria GEM. Reviewed evidence about the safety of the daily use of alcohol-based mouthrinses. Braz Oral Res 2008; 22 (Suppl 1): 24-31.
3. O'Reilly M. Oral care of the critically ill: a review of the literature and guidelines for practice. Aust Crit Care 2003; 16(3): 101-10.
4. Lachenmeier DW. Safety evaluation of topical applications of ethanol on the skin and inside the oral cavity. J Occup Med Toxicol 2008; 3: 26.
5. Satpathy A, Ravindra S, Porwal A, Das AC, Kumar M, Mukhopadhyay I. Effect of alcohol consumption status and alcohol concentration on oral pain induced by alcohol-containing mouthwash. J Oral Sci 2013; 55(2): 99-105.
6. Wigmore JG, Bugyra LM. Decreasing the mouth alcohol effect by increasing the salivary glow rate decreasing the mouth alcohol effect by icreasing the salivary flow rate. Can Soc Forens Sci J 2003; 36(4): 211-6.
7. McCullough MJ, Farah CS. The role of alcohol in oral carcinogenesis with particular reference to alcohol-containing mouthwashes. Aust Dent J 2008; 53(4): 302-6.
8. Gagari E, Kabani S. Adverse effects o f mouthwash use. A Review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1995; 80(4): 432-9.
9. Adams D, Addy M. Mouthrinses. Adv Dent Res 1994; 80(2): 291-301.
10. Kerr a R, Katz RW, Ship J a. A comparison of the effects of 2 commercially available nonprescription mouthrinses on salivary flow rates and xerostomia. Quintessence Int 2007; 38(8): e440-e447.
11. Gupta A, Epstein JB, Sroussi H. Hyposalivation in elderly patients. J Can Dent Assoc 2006; 72(9): 841-6.
12. Daelemans M, Sternon J. Drug-induced dry mouth. Rev Med Brux 1985; 6(8): 575-7.
13. Yuan A, Woo S. Adverse drug events in the oral cavity. Oral Surgery, Oral Med Oral Pathol Oral Radiol 2015; 119(1): 35-47.
14. Dodds MWJ, Johnson DA, Yeh CK. Health benefits of saliva: A review. J Dent 2005; 33(3): 223-33.
15. Pai S, Ghezzi EM, Ship JA. Development of a visual analogue scale questionnaire for subjective assessment of salivary dysfunction. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001; 91(3): 311-6.
16. Flink H, Tegelberg Å, Lagerlöf F. Influence of the time of measurement of unstimulated human whole saliva on the diagnosis of hyposalivation. Arch Oral Biol 2005; 50(6): 553-9.
17. Kerr AR, Corby PM, Kalliontzi K, McGuire JA, Charles CA. Comparison of two mouthrinses in relation to salivary flow and perceived dryness. Oral Surg Oral Med Oral Pathol Oral Radiol 2015; 119(1): 59-64.
18. Chadwick B, Addyt M, Walkers DM, Wade WG. Short communication effect of a 0 . 1 per cent hexetidine mouthwash on the microflora in aphthous ulceration. Microb Ecol Health Dis 1991; 4: 181-6.
19. Napeñas JJ, Brennan MT, Fox PC. Diagnosis and treatment of xerostomia (dry mouth). Odontology 2009; 97(2):76-83.
20. Takeuchi K, Furuta M, Takeshita T, Shibata Y, Shimazaki Y, Akifusa S, Ninomiya T, Kiyohara Y, Yamashita Y. Risk factors for reduced salivary flow rate in a Japanese population : the Hisayama Study. Biomed Res Int 2015; 2015: 381821.
21. Beirne OR. Advances in dental research. J Am Dent Assoc 1990; 121(6): 672, 674.
22. Holsinger F, Bui D. Anatomy, function, and evaluation of the salivary glands. Salivary Gland Disord pittsburgh Springer; 2007. p. 1-15.
23. Kranthikumar R, Ashwinmkumar K, Kiran Kumar D, Karthikeyan D,A Review Buccal Mucosa and Buccal Formulations. IJIPSR 2014; 2(9): 1957-1987.
24. Haq MW, Batool M, Ahsan SH, Qureshi NR. Alcohol use in mouthwash and possible oral health concerns. J Pak Med Assoc 2009; 59(3): 186-90.

DOI: 10.20473/j.djmkg.v48.i3.p109-112