

Comparison Chlorohexidine vs Herbal mouthwash on Salivary pH in Orthodontic appliance patients

Israa R. Alkasso
BPhS

Ministry of Health-Nineveh Health Directorate

Ghada A. Taqa
BVMS, MSc, PhD(Prof.)

Department of Dental Basic Sciences
College of Dentistry, University of Mosul

Sarmad S. Al qassar
BDS, MSc, PhD (Iec.)

Department of Ortho, Pedo. and Preventive Dentistry
College of Dentistry, University of Mosul

الخلاصة

الاهداف: الهدف من هذه الدراسة هي مقارنة الفرق بين اثنين من غسولات الفم (غسول عشبي وغسول كلوروهيكسيدين) على درجة الحموضة اللعابية لدى مرضى الأجهزة التقويمية بعد التحدي الحمضي من خلال تناول مشروب غازي (مشروب غازي الكوكا كولا) ومقارنته مع درجة الحموضة الأساسية وتحديد مدة نشاط غسول الفم الذي سوف يستمر لحماية الأسنان والغشاء المخاطي للفم من الحموضة الحمضية. **المواد وطرائق العمل:** تضمنت هذه الدراسة ٢٠ مريضاً واضعين الأجهزة التقويمية تم تقسيمهم الى مجموعتين. بعد تناول كوب واحد من المشروبات الغازية (كوكا كولا) ثم يتغرون باحدى الغسولات الفموية لمدة ١٠-٥ ثواني بعد ذلك تم قياس درجة حموضة اللعاب في الاوقات ٠,٥,١٠,١٥ دقيقة بعد شرب (كوكا كولا). **النتائج:** اظهرت النتائج ان هناك فرقا معنوياً كبيراً في درجة الحموضة بعد شرب الكوكا كولا (٠,٤٧ ± ٠,٦٨٩ بالمقارنة مع خط الأساس (٠,٣٠ ± ٠,٦٦٥) ودرجة الحموضة بعد استخدام الغسول الفموي العشبي في الاوقات (٠,٥,١٠,١٥) على التوالي (٠,١١ ± ٠,٦٧٩) (٠,١١ ± ٠,٦٧٩) (٠,١٣٩ ± ٠,٦٥٨) (٠,١٨٨ ± ٠,٦٥٣) ودرجة الحموضة بعد استخدام الغسول الفموي الحاوي على الكلوروهيكسيدين في الاوقات (٠,٥,١٠) على التوالي (٠,٢٣١ ± ٠,٦٧٣) (٠,١٥٩ ± ٠,٦٥٩) (٠,١٦٦ ± ٠,٦٥١) ان هناك فرقا معنوياً كبيراً في درجة الحموضة بعد استخدام الغسول الفموي الحاوي على الكلوروهيكسيدين في الوقت ١٥ (٠,١٩ ± ٠,٦٣٧) بالمقارنة مع خط الأساس عند (P < 0.05) ، في حين لم تكن هناك فروق ذات دلالة إحصائية بين درجة الحموضة اللعابية الأساسية وقياسات درجة الحموضة في الاوقات المختلفة الأخرى. **الاستنتاجات:** استخدام اي من الغسولان ادى الى رفع درجة حموضة اللعاب أعلى من درجة الحموضة الأساسية وحسناً من قدرة اللعاب على معادلة الحمضية

ABSTRACT

Aims: This is a comparative study for two different mouthwashes (Herbal mouthwash vs Chlorohexidine mouthwash) on salivary pH in Orthodontic patients after acidogenic challenge by taking a carbonated beverage, compare it with baseline pH and determined the duration of action of mouthwash at which it will persist to protect teeth and oral mucosa from acidic pH. **Materials and Methods:** Twenty orthodontic patients were involved, 10 patients in each group, after taking one cup of carbonated beverage, they were gargling with one mouthwash for 5-10 seconds, then saliva pH was measuring in 0,5,10,15 minutes after gargling. **Results:** significant difference in pH after Pepsi drinking (5.47 ± 0.689) in compare with Baseline pH (6.65 ± 0.303), pH after Herbal Mouthwash at 0 time (6.79 ± 0.110), pH after 5mins (6.7 ± 0.115) from Herbal Mouthwash, pH after 10mins from Herbal Mouthwash (6.58 ± 0.139) and pH after 15mins from herbal mouthwash (6.53 ± 0.188), pH after zero min from gargling with Chlorohexidine Mouthwash (6.73 ± 0.231), pH after ٥mins from Chlorohexidine Mouthwash (6.59 ± 0.159), pH after 10mins from Chlorohexidine mouthwash (6.51 ± 0.166) and significant difference in pH after 15mins from Chlorohexidine mouthwash (6.37 ± 0.194) in compare with baseline pH at (P < 0.05), while there were no significant differences between baseline salivary pH and the other pH measurement. **Conclusion:** Application both mouthwashes were elevated saliva pH directly higher than baseline pH and both are effective in enhancing saliva buffering capacity.

Key words: Chlorohexidine, Herbal mouthwash, Orthodontic patients, Salivary pH

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INTRODUCTION

Dental caries is the commonest infectious disease on in the world. One of the elements that associate with caries incidence is the interaction of tooth structure and deleterious factors in saliva and plaque^[1]. Saliva is a completely unique oral fluid produced from primary and minor salivary glands. It may be used to offer clinical statistics about patients. Rapid increase in the used of saliva as a diagnostic medium within the last few years, it can be performed by measuring antibodies and protein concentration in saliva, flow rate of saliva, salivary pH and its buffering capacity^[2]. Regular Salivary pH ranged 6.2-7.6 with 6.7 being the common pH. Resting salivary pH shouldn't drop lower than 6.3 Within the mouth, salivary secretion compensates these decreases in pH by control it components secretion, saliva flow evacuates carbohydrates that would be metabolized by oral normal flora and create acid that secreted in the saliva. Also, corrosiveness from drinks and diets, as well as from bacterial waste products, is neutralized through the salivary buffering capacity by increase bicarbonate secretion in saliva^[3]. A critical pH equal to 5.5 was reported in dental studies, a further lower in salivary pH is the reasons of tooth decay by change association of calcium and phosphate, this pH considers dangerous on structure and progression of dental enamel^[4].

Orthodontic appliance is an intraoral device used to carry out orthodontic procedures, e.g. to correct malocclusion; it may be fixed or removable. In addition to looking and feeling great, there are many other benefits to having straight teeth and proper jaw alignment^[5]. divided into removable, fixed and removable-fixed. Fixed orthodontic appliance are used to treat the complicated cases of malocclusion, which allow greater range of movement, which is more complicated, more expensive, difficult to clean, need special equipment and less esthetic^[6]. These appliances are associated with higher risk of dental caries and periodontitis, it had been showed that up to 6-10% increases in oral bacterial count after Placement of orthodontic appliance. Orthodontic appliance patients are two to three time more frequent to have dental Plaque than patient without orthodontic appliance^[7].

A mouthwash is a medicinal fluid which is held within the mouth and washed by the activity of perioral musculature to kill the mouth pathogens to fight gingivitis. Mouthwash reaches mouth areas that are difficult to touch by tooth Brush. A mouthwash may be prescribed to treat diseases, decrease irritation, diminish ache and diminish halitosis or to provide fluoride to fights caries^[8].

Chlorhexidine is considered as the gold standard for controlling the dental Plaque and gingivitis, it is successful active against both

Gram positive and Gram-negative microbes counting aerobes and anaerobes bacteria, yeasts, parasites and lipid envelope of infections ^[9]. Different chemical mouthwashes are accessible within the showcase, but are related with side-effects such as prompt allergic responses, poisonous quality, tooth recoloring, etc. Alternate medicines may be created from plants that contain natural medicinal constituents have pharmacological effects such as anti-inflammatory, antioxidant, antiulcer and sedative effects, that can replace synthetic drugs ^[10]. These lead to questions which one is superior in upgrading salivary buffering capacity. Subsequently this think about pointed to compare the impact of chlorhexidine and natural mouth washes on Salivary buffering capacity.

MATERIALS AND METHODS

Study sample:

this study protocol was reviewed and approved by the scientific committee of Nineveh Health Directorate, Mosul, Iraq NO.26139. The study was carried out in Department of Orthodontics, Pedodontics and Preventive Dentistry - College of Dentistry/University of Mosul/Mosul, Iraq. Study was consisting of 20 orthodontic patients, mean aged (16.33 ± 3.51) years who at least have 2 months wearing the orthodontic appliance.

In this study, health patient without concomitate other mouth or systemic disease, non-smoker, non-alcoholic, without known allergic history to any of our tested materials, without history of any complication after orthodontic application and patients wasn't currently on prescribed drugs were included.

Grouping and intervention:

Ten patients were included in each group, how informed not to brushed their teeth or use mouthwash for up to 12 hours and not to eat or drink anything's for one hour before procedure, Baseline pH were taking by using compact pH meter (HORIBA's LAQUAtwin, Kyoto, Japan. That consist of Chamomile, Oak park, sodium fluoride and triclosan) at which patients were directly spited in the concave part of the pH meter, recorded pH reading, after that patients were taking one cup (100ml) of carbonated beverage (made by Coca Cola® Company, Irbil, Iraq), that gargle with it for 10 seconds (same as mouth wash) before swallowing it, pH of saliva was directly recorded after that. One group were used 5ml of Herbal mouthwash (Vitex maximum orthodontic care mouthwash that made by made by CJSC "Vitex" company in Republic of Belarus, 2 Smirnova str., Minsk.)(pH of herbal mouthwash=7.4), While the other group used 5ml of Chlorhexidine mouthwash (Biofresh Antiseptic Mouthwash K, made by Scitra company for Biofresh LLC, United Arab Emirates) (pH of Chlorhexidine mouthwash=6.4), they were gargling with

mouthwash for 5-10 seconds (according to British pharmacopeia) then spit it out, saliva pH was measuring after gargling at 0, 5, 10 and 15 minutes after that.

Statistical-analysis

The data were expressed as mean \pm SD, difference between three experimental groups were statistically analyzed by one-way analysis of variance (ANOVA) followed by the Duncan. The level of significance was at $p < 0.05$.

RESULTS

The results of measurement salivary pH for patients using herbal mouthwash were shown in Figure (1) reveal the mean value of the pH measurement after carbonated beverage in compare with mean baseline pH measurement and 0, 5, 10, and 15 minutes mean pH measurement after Herbal mouth washgargling.

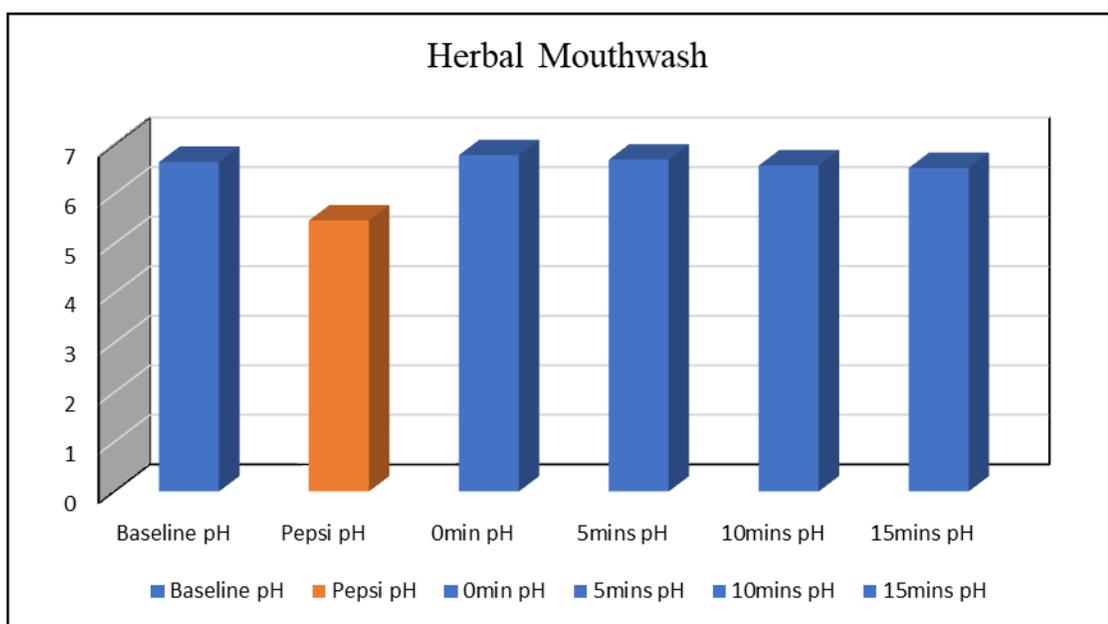


Figure (1): Mean salivary pH measurement for patients before and after carbonated beverage and Herbal mouthwash gargling.

(Table 1) that revealed the means and standard deviation for salivary pH before and after gargling with carbonated beverage and Herbal mouthwash, and comparison between this salivary pH measurement that done by One way analysis of variance (ANOVA), there were a significant difference in salivary

pH after carbonated beverage (5.47 ± 0.689) in compare with baseline salivary pH (6.65 ± 0.303), salivary pH after Herbal Mouthwash at 0 time(6.79 ± 0.110), salivary pH after 5mins(6.7 ± 0.115) from Herbal Mouthwash, salivary pH after 10mins from Herbal Mouthwash (6.58 ± 0.139) and salivary pH

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after 15mins from herbal mouthwash (6.53 ± 0.188) ($P < 0.05$), while there were no significant differences between baseline salivary pH in compare with salivary pH

measurement after 0, 5, 10 and 15 minutes after gargling with Herbal mouthwash ($P > 0.05$).

Table (1): Comparison of pH measurement for patients before and after carbonated beverage and Herbal mouthwash gargling

PH	(Mean \pm SD)	F	P-value
Baseline	(6.65 ± 0.303) ^a		
After carbonated beverage	(5.47 ± 0.689) ^b		
After Herbal Mouthwash at 0 time	(6.79 ± 0.110) ^a		
After 5mins from Herbal Mouthwash	(6.7 ± 0.115) ^a		
After 10mins from Herbal Mouthwash	(6.58 ± 0.139) ^a		
After 15mins from Herbal Mouthwash	(6.53 ± 0.188) ^a	22.254	0.001

*significant at $p < 0.05$

a: mean significant difference between all time and after carbonated beverage.

Figure (2) reveal the mean value of the pH measurement after carbonated beverage in compare with baseline salivary pH, 0, 5, 10 and 15 minutes after chlorohexidine

mouthwash gargling and differences between baseline salivary pH and 15minutes salivary pH measurement from chlorohexidine mouthwash gargling.

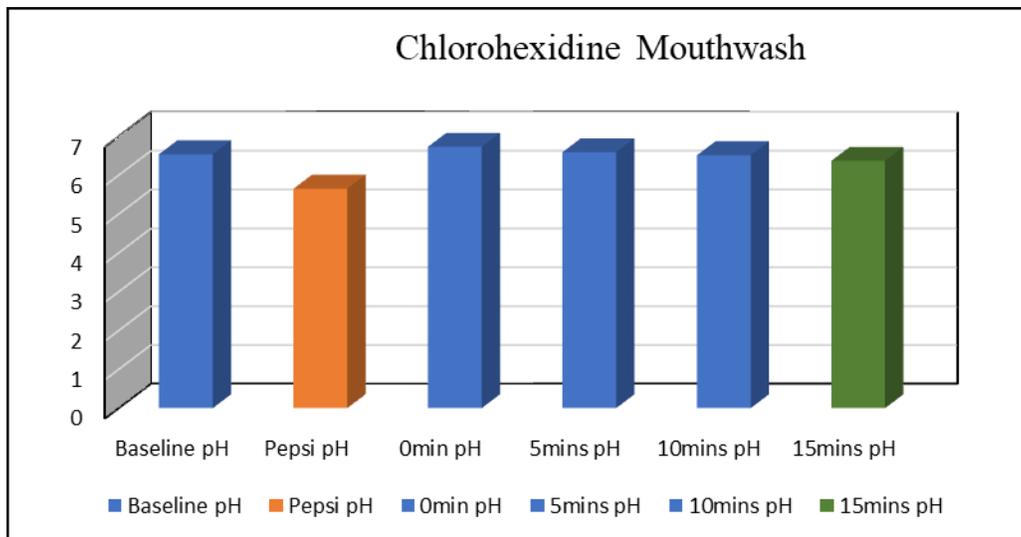


Figure (2) : mean salivary pH measurement for patients before and after carbonated beverage and chlorohexidine mouthwash gargling.

(Table 2) reveal the results of mean salivary pH measurement for patients before and after gargling with carbonated beverage and Chlorohexidine mouthwash, and comparison between this pH measurement which done by One way analysis of variance (ANOVA), there were a significant difference in salivary pH after carbonated beverage in compare with baseline salivary pH, salivary pH after Chlorohexidine Mouthwash at 0, 5, 10,

and 15mins from Chlorohexidine mouthwash (P<0.05), there were also a significant differences between baseline salivary pH from Chlorohexidine mouthwash with salivary pH 15mins from Chlorohexidine mouthwash (P<0.05), while there were no significant differences between baseline salivary pH and 0, 5, 10 and 15 minutes salivary pH measurement from Chlorohexidine mouthwash gargling.

Table (2): Comparison of pH measurement for patients before and after carbonated beverage and Chlorohexidine mouthwash gargling

PH	(Mean ±SD)	F	P-value
Baseline pH	(6.65 ± 0.303) ^{ab}		
pH after Pepsi	(5.47 ± 0.689) ^b		
pH after Chlorohexidine Mouthwash at 0 time	(6.73 ± 0.231) ^a		
pH after 5mins from Chlorohexidine Mouthwash	(6.59 ± 0.159) ^{ab}		
pH after 10mins from Chlorohexidine Mouthwash	(6.51 ± 0.166) ^{ab}	18.494	0.001
pH after 15mins from Chlorohexidine Mouthwash	(6.37 ± 0.194)		

*significant at $p < 0.05$

a: mean significant difference between all time and after carbonated beverage

b: mean significant difference between baseline and 15min after chlorohexidine

Figure (3) show the difference between the two groups as there were no significant

differences between these groups.

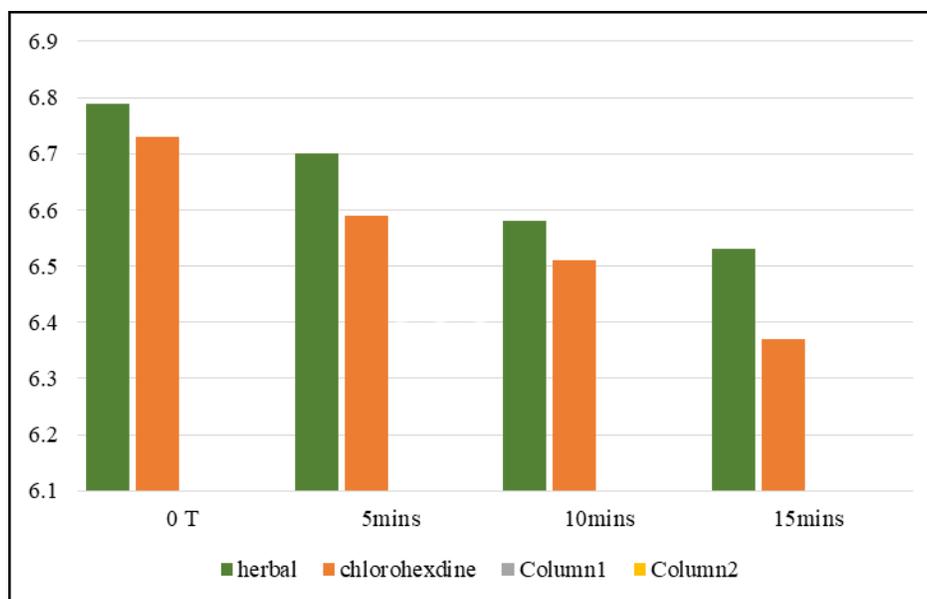


Figure (3) : Comparison of Salivary pH measurement between chlorohexidine mouthwash patients and herbal mouthwash patients.

DISCUSSION

The utilize of a particular kind of mouthwash remains to be an unresolved problem. This study found that saliva pH drops to about 5.47 immediately after drinking carbonated beverage while after herbal mouthwash upsurges pH directly to reach 6.79 which is higher than baseline. It persisted for several minutes then it retains to approach baseline pH, while after chlorohexidine mouthwash upsurges pH directly to reach 6.73 which is higher than baseline pH 6.65 that persist for few minutes then it retains to approach baseline pH, then drop back to have pH lower than baseline pH after 15mins from chlorohexidine mouthwash.

This study is in agree with *Bagchi et al.*^[11] findings that discovered that the anti-plaque and antigingivitic consequences of herbal mouth rinse was similar to that of 0.2% chlorhexidine mouth rinse and significantly higher than rinsing with distilled water, also in agree with *Rahmani et al*^[12]. That examined the anti-plaque and antigingivic activity of mouthwashes that appeared enhancement in both plaque and gingival record (GI) scores. We agree with *Ahmed et al.*^[13] that encourage used of herbal mouthwash that contain chamomile as it has bacteriostatic effects against streptococcus mutans and cause reduction in salivary pH.

Now a days, there's an expanding in utilizing of natural mouth washes since of the

spread the culture of complementary and elective pharmacology and because of the more grounded accept that the substitute cure is with less side impacts. The increase of antibiotic resistance in addition to unwanted side effects of synthetic pills such as enamel staining on long-time period use, unpleasant taste, and also, they're better in cost. Hence, there is a want for brand new antimicrobial sellers of plant origin which is safe, preventive, and reasonably-priced as well ^[14]. Researchers, settled that natural components or substances are various with appreciate to composition chemical structure. Herbal goods lack labeling and information that provide comprehensive history of the substances, composition and it has also been shown that they have been contaminated with other herbal contaminants and heavy metals that make them unsafe for future usage ^[15].

Typical mouthwash (like chlorohexidine mouthwash) is consists of the high alcoholic content. This can-do damage to your gums and teeth. With those, the oral mucosa gets irritated. But if you have sensitive gums, you might also feel the ache. Since the natural mouthwash contains no alcoholic residues and is gentler on the mouth tissue ^[16].it also have a refreshing feeling with no bitter test or loss of sensation which seen with other chemical mouthwash. This result agreement with other study suggested that the application herbal as a mouth rinse providing increase in saliva pH and produce alkaline

environment which is beneficial to the oral health ^[17].

It is thus far justified that further research are to be carried out with greater focus on a well-known gold evaluation as opposed to the preferred herbal merchandise in order to expose the efficacy and thereby prove its strength. Further clinical studies to establish the toxic impact of the item under tested are to be carried out.

CONCLUSION

Both Herbal and chlorohexidine mouthwash shows beneficial effects to elevation salivary pH and return to more that salivary pH baseline after taking one cup of carbonated beverage.

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