

A new type of powder denture cleaner

Amer A TAQA*

Tarik Y QASSAB-BASHI**

Issam K AL-KHAYAT***

ABSTRACT

A new type of weak acid (oxalic acid)-sodium carbonate of bicarbonate powder mixture denture cleaner was prepared. The powder mixture was examined pre-clinically and clinically to clean partial and complete dentures using immersion technique. It gave us a good cleaning effect through removing calculus and stains, beside its neglectable effect on denture base materials.

Key Words: Denture cleaner, oxalic acid, sodium carbonate.

الخلاصة

تم تحضير نوع جديد من منظف طقوم الأسنان والمكون من حامض الأوكزاليك وبيكاربونات أو بيكاربونات الصوديوم. تم فحص الباوذر المَحَضَّر مختبرياً وسريراً لتنظيف الطقوم الجزئية والكاملة باستخدام طريقة التغطيس. أعطى الباوذر كفاءة عالية عالية في إزالة الترسبات واصفرار الأسنان بدون أية تأثيرات على قاعدة الطقم.

INTRODUCTION

There are wide varieties of denture cleaners used to remove soft food debris and hard deposits of calculus and stains on denture base and teeth. The most common of them used immersion technique and marketed as powder, tablets or liquid. In spite of the large variety of these cleaners and their different mode of action each has its advantages and disadvantages^(1,2). The present work aims to introduce a new type of powder weak acid cleaner, which has a better quality than available cleaners in the market.

*Amer Abdul-Rahman TAQA; BSc, MSc, PhD: Assistant Prof. Department of Basic Sciences, College of Dentistry, University of Mosul, Mosul, IRAQ.

**Tarik Yasin QASSAB-BASHI; BDS, MSc: Assistant Prof. Department of Prosthetic Dentistry, College of Dentistry, University of Mosul, Mosul, IRAQ.

***Issam Kamal AL-KHAYAT; BSc, PhD: Assistant Prof. Department of Basic Sciences, College of Dentistry, University of Mosul, Mosul, IRAQ.

MATERIALS AND METHODS

Preparation of Powder

Pure anhydrous oxalic acid and anhydrous sodium carbonate or bicarbonate were used (Fluka chemical, Germany). The carbonate salts were dried in air oven at (110) °C for (30) minutes before being used. Equivalent molar amount of oxalic acid and sodium carbonate or one molar equivalent of oxalic acid and two molar equivalents of sodium bicarbonate were mixed and packed in airtight bottles for future use, since prolonged exposure of the mixture to air may absorb moisture.

Instruction for Use

One or two teaspoonful of the powder (each teaspoonful equivalent approximately to 2g) were added to a glass of water containing the denture to be cleaned, stirred and kept for different period of times; then the denture is removed and washed thoroughly with tap water with a little bit of brushing.

Pre-clinical Trial

Ten of each complete and partial dentures were soaked in tea solution for (48) hours to be stained; then the effect of the powder was examined as above "instruction for use" on the stains formed on denture base and teeth.

Clinical Application

Patients with partial or complete dentures were instructed to use our cleaner for different period of times as illustrated in table (1).

Table (1): Immersion time and quantity of powder denture cleaner used for partial and complete dentures

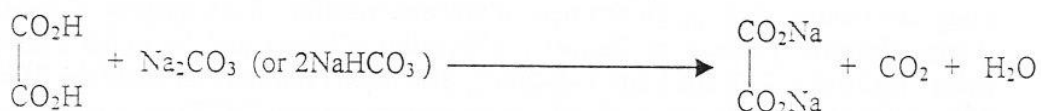
Number of Dentures		Period of Immersion (Hours)	Number of Teaspoonful
Partial	Complete		
5	-	6	1
5	-	12	1
5	-	24	1
5	-	36	1
5	-	9	2
5	-	12	2
5	-	24	2
5	-	36	2
-	10	6	1
-	10	12	1
-	10	24	1
-	10	36	1
-	10	6	2
-	10	12	2
-	10	24	2
-	10	36	2

RESULTS AND DISCUSSION

Chemistry

Oxalic acid is a naturally occurring weak organic acid⁽³⁾ and known for its bleaching activity⁽⁴⁾ on stain and expressed to react with calculus (mainly calcium salt deposits) formed on teeth to form calcium oxalate, beside its very low toxicity and present in many citrus fruits⁽³⁾.

When the powder mixture is added to water, immediate reaction between oxalic acid and sodium carbonate occur to form sodium oxalate and evolve carbon dioxide gas which remove debris mechanically beside the effect of acid on calculus and its bleaching effect on stains as the following reaction illustrates:



The above formula has better cleaning properties over other formula by using oxidizing agents such as hypochlorite or perborate⁽⁵⁾ which release oxygen that in turn loosen debris via mechanical means but may corrode stainless steel and cobalt-chromium alloys beside the dangerous effect of free oxygen (free radical) on soft tissues.

Clinical Observations

The following remarks were concluded from table (1): Increase the time of soaking and quantity of powder will improve the effect of powder cleaner. However, prolonged immersion (more than 24 hours) and higher quantity (more than two teaspoonful) of powder will have the same effect. Also, it was noticed that partial dentures would have shiny appearance of their clasps after application of our cleaner.

So, from the preset study, it is concluded that the best quantity and time of our prepared cleaner to be used is two teaspoonful of the material for (24) hours for both partial and complete dentures.

REFERENCES

1. Anusavice KS. Phillips Science of Dental Materials. 10th Edn. WB Saunders Co. 1996; Pp: 267-268.
2. Faraj SAA, Al-Dabagh R. The effect of denture cleaners on surface roughness of denture base materials. *Iraqi Dent J.* 2000; 25: 121-136.
3. Majeed S, Mahmud MJ. Iraqi Medical Plants Between Folk Usage and Scientific Research. 1st Edn. Ministry of Higher Education and Scientific Research. 1988; Pp: 27, 75.
4. Fessenden RJ, Fessenden JS. Fundamental of Organic Chemistry. Harper & Row Publications. 1990; Pp: 36-38.
5. Graig RG, O'Brien WL, Powers JM. Dental Materials: Properties and Manipulation. 6th Edn. The Mosby Co. 1996; Pp: 107-109.