

# Determination of Salivary pH in Patients With Recurrent Aphthous Ulceration (RAU)

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## الملاصة

**الأهداف:** هو تحديد مقياس حمضية اللعاب عند المرضى المصابين بالتهقرح القلاعي الفموي. **المواد وطرق العمل:** تم أخذ عينات اللعاب من 60 شخصا قسما إلى مجموعتين، مجموعة المرضى التي شملت 30 مريضا ومجموعة السيطرة التي شملت 30 شخصا سليما. **حمضية اللعاب** تم قياسها باستخدام جهاز قياس الحمضية. **النتائج:** أظهرت وجود فرق معنوي كبير بين مجموعة المرضى ومجموعة السيطرة، في حين لم يظهر فرق معنوي بين الذكور والإناث في المجموعتين. **الاستنتاجات:** مقياس حمضية اللعاب لدى ذكور مجموعة المرضى كان أكثر مقارنة مع ذكور مجموعة السيطرة.

## ABSTRACT

**Aims:** To determine salivary pH in patients with recurrent aphthous ulceration and in control normal subjects. **Materials and Methods:** A controlled clinical trial was performed on 60 subjects divided into 30 normal subjects and 30 patients with recurrent aphthous ulceration. The salivary pH was determined using a chair-side pH meter. **Results:** Highly significant difference in pH level was observed between patients and control groups (t-value 5.420, p< 0.0001). There were no significant differences in pH levels between males and females in both patients and control groups. **Conclusions:** The pH of saliva in male patients with (RAU) was more toward acidic pH than normal male subjects.

**Keywords:** Recurrent aphthous ulceration, saliva pH, saliva buffering system.

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## INTRODUCTION

Recurrent aphthous ulceration (RAU) is a chronic inflammatory disease characterized by painful recurring ulcers of the oral mucosa.<sup>(1)</sup> It is occurring in up to 30% of population.<sup>(2)</sup> The most common presentation is recurrent, round, clearly defined, small painful ulcer with shallow necrotic centers, raised margins and erythematous halos.<sup>(1)</sup> This lesion is one of the least understood diseases of the oral cavity.<sup>(3)</sup> There have been numerous proposed etiologic mechanism for RAU including local microbial, systemic nutritional, immunologic, genetic, psychological and endocrinological factors<sup>(4,5)</sup> The cause remains idiopathic or a result of a variety of predisposing factors.<sup>(5)</sup>

Saliva is considered as a vital importance for maintaining health of the oral mucosa.<sup>(6)</sup> An important role of saliva in

maintaining the integrity of the oral tissues is the control of oral pH.<sup>(7)</sup> The pH of saliva is maintained by the carbonic acid/bicarbonate system, phosphate system and protein system.<sup>(8)</sup> A number of salivary constituents may contribute to the ability of saliva to control pH, but the most important one of them is bicarbonate.<sup>(9)</sup> The concentration of bicarbonate in saliva increases with the rise in salivary flow and the pH changes with flow.<sup>(10)</sup> Many studies of salivary pH estimate a range of 5.5 to 7.9, with the higher pH exhibited upon increased salivary flow rate (SFR).<sup>(11)</sup> It has been reported that there was an association between RAU and decreased salivary pH.<sup>(12)</sup> The aim of the present study is to determine the salivary pH in patients with RAU and in a control group and to assess its relation to disease development.

**MATERIALS AND METHODS**

The sample consisted of 60 patients and subjects from Oral Medicine Clinic, Teaching Hospital, College of Dentistry, University of Mosul; divided into two groups, 30 patients with RAU as patients group and 30 normal subjects as a control group. The patients group consisted of 15 females and 15 males of age ranging from 19 to 23 years with a mean age of 21.1 years. The control group consisted of 15 females and 15 males of age ranging from 21 to 23 years with a mean age of 21.83 years. The selected samples of both groups were dental students with good oral hygiene.

The RAU group satisfied the following criteria:

1. Objective confirmation of RAU disease through history and clinical features described by Ship 1996 (1), was the criteria which the authors depended on to register a case as a RAU.
2. Current active lesion of RAU.

3. All the patients were non smoker and had minor aphthous ulcers.

The control group meet the criteria of no previous history of the disease and did not have current lesion of RAU.

A sample of 2ml mixed whole unstimulated saliva was collected from each subject and patient in a sterilized plane tube 3 hours after breakfast. Salivary pH was determined using a chair-side pH meter (Philips Comp. pH meter).

The results were expressed as mean and standard deviation. Statistical difference between the pH levels in the two groups and between males and females in each group were determined according to student's t-test.

**RESULT**

In this study the results showed that highly significant difference in salivary pH level was observed between RAU group and control group (t-value: 5.420, P<0.001) as shown in Table (1).

Table (1) Comparison of salivary pH level between patients with RAU and control groups.

Parameter	Control 30		Patients 30		t-value	p-value
	Mean	SD	Mean	SD		
<b>Salivary pH</b>	7.1567	0.25665	6.60683	0.49114	5.420	0.0001 HS

HS: Highly significant

There was no statistically significant difference between males and females in

patients and control groups as revealed by Tables (2, 3).

Table (2) Comparison of salivary pH level between male and female in control group.

Parameter	Male Control 15		Female Control 15		t-value	p-value
	Mean	SD	Mean	SD		
<b>Salivary pH</b>	7.188	0.17251	7.1253	0.32339	0.662	0.515 NS

NS: Not Significant

Table (3) Comparison of salivary pH level between male and female in Patients with RAU group.

Parameter	Male Patients 15		Female Patients 15		t-value	p-value
	Mean	SD	Mean	SD		
<b>Salivary pH</b>	6.6067	0.43048	6.61	0.56068	-0.018	0.986 NS

NS: Not Significant

Healthy females had a significantly higher pH (more alkaline) than RAU fe-

males (t-value: 3.084, P<0.05) as shown in Table (4).

Table (4) Comparison of salivary pH level between female in Patients with RAU and Control groups.

Parameter	Female Control 15		Female Patients 15		t-value	p-value
	Mean	SD	Mean	SD		
Salivary pH	7.1253	0.32339	6.61	0.56068	3.084	0.005 S

S: Significant.

Salivary pH was highly significantly lower in RAU males than control group

males (t-value: 4.858, P<0.001) as demonstrated by Table (5).

Table (5) Comparison of salivary pH level between male in Patients with RAU and Control groups.

Parameter	male Control 15		male Patients 15		t-value	p-value
	Mean	SD	Mean	SD		
Salivary pH	7.188	0.17251	6.6067	0.43048	4.855	0.0001 HS

HS: Highly significant.

### DISCUSSION

Saliva is necessary for pH balance and it is being used for the diagnosis of a wide range of diseases, as saliva is proven to be an easily obtained, valuable, reliable and non invasive diagnostic media.<sup>(7)</sup> The role of salivary hyperacidity in the pathogenesis of RAU is supported by the observation of dramatic healing of such ulcer when alkaline lotions are applied.<sup>(13)</sup>

In the present study, RAU patients showed significantly higher levels of acidic saliva when compared to control group, this result was in agreement with some studies that have demonstrated that the levels of salivary pH are declined in patients with RAU.<sup>(11)</sup> However the clinical implications of this finding are poorly understood, ranging from alkaline saliva being considered as a protective media to being considered as an aggressive media. In this study, there was a positive relation of acidic saliva with RAU, probably because salivary PH is modified by the quantity of saliva. Salivary flow rate (SFR) influences the pH of saliva.<sup>(10)</sup> Some studies using chewing gum have shown that an increase in mastication in normal subjects enhances the bite force as well as the SFR.<sup>(11)</sup> In RAU group there was decreased SFR which turn the pH of patient's saliva more acidic due to

painful ulcer.

Lastly, the difficulty in determining the exact nature of RAU is in part due to non-specific histopathological features and to the lack of any reproducibly identifiable endogenous or exogenous causes.

### CONCLUSIONS

In conclusion, the present study revealed that RAU development is affected by acidic pH and also observed more acidity in saliva of male patients. It concluded that salivary pH with acidic value significantly affects RAU development.

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