

## Periodontal Health Condition and Salivary Parameters Among a Group of Patients with Rheumatoid Arthritis in Al- Najaf City

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### Abstract

**Background:** Periodontitis (PD), the most common oral disease, is a destructive inflammatory disease of the teeth supporting tissues and is caused by group of specific microorganisms included: *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythia*, and *Aggregatibacter actinomycetem-comedias* and this condition is categorized by both destruction of connective tissue and alveolar bone due to a chronic inflammation. In periodontitis the clinical findings of bone resorption and the clinical attachment loss around the tooth are a result of inflammatory mediated alterations to remodeling balance of the bone.

**Material and Method:** The samples consist of 60 female participants, 30 were in healthy condition (not suffering from systemic disease and not taking any medication) and 30 with rheumatoid arthritis, with age between (40-45) years. Periodontal status of the two groups was assessed by measuring the probing pocket depth, periodontal attachment loss, plaque index, calculus index and gingival index and salivary sample were collected after subjecting all participants for saliva stimulation and measuring the salivary PH and flow rate for them.

**Results:** The rheumatoid arthritis(RA) group showed a highly significant difference in probing pocket depth(PPD), Plaque index(PI),gingival index(GI),calculus index(CAL.I) and loss of attachment(LA) compared to Non-RA group, while there is significantly decrease in salivary flow rate among RA patients when compared to control groups and there is no significant difference in salivary PH between two groups.

**Conclusion:** The results of this study provide evidence of a highly significant relationship between rheumatoid arthritis and periodontal disease this may be due to the similar pathophysiology nature of both diseases.

**Key words:** Periodontal Diseases, Rheumatoid arthritis, loss of attachment, pocket depth, plaque index, calculus index, gingival index, salivary flow rate and PH.

### Introduction

Rheumatoid arthritis (RA) is a chronic destructive inflammatory disease described by the accumulation and perseverance of an inflammatory infiltrate in the synovial membrane that leads to synovitis and the destruction of the joint architecture [1]

RA is an autoimmune disease and the cause of RA is not recognized, although its etiology appears to be multifactorial and may include infection, genetic, endocrine and immunological reasons. It is the commonest of all

disorders of the joints which leads to polyarthritis, inflammation of the synovial membrane and destruction of tissue. It appearances 5% higher prevalence in females than in males in the total population of the world, also the age plays a major role and a minor of age, the environmental, hormonal and infectious conditions are the co-factors which may also be elaborate in the progression of RA. [2]

Rheumatoid arthritis was first defined clinically in 1800 in a doctoral thesis by Landre-Beauvais, a French medical student, who known as the condition "primary aesthetic gout." Sir Alfred Garrod recognized the difference between RA and gout in 1859 and gave the condition its existing name [3].

The incidence of periodontal disease has increased in patients with rheumatoid arthritis (RA) compared to non-rheumatoid arthritis population, because of the both diseases shared pathological mechanisms like increased T-cells, IL-17 and increased B-cell function, smoking and infection with the Epstein-Barr virus and cytomegalovirus consider as a risk factor for both conditions, It seems some studies detected increase cytokine level in both diseases [4].

Recently, there has been growing indication suggesting an association between periodontitis and rheumatoid arthritis, as both these conditions are associated with the bone destruction, Possibly a bidirectional relationship between RA and periodontitis may involve RA, thus disturbing the pathogenesis of periodontitis and vice-versa, Still, there is the possibility of a common genetic trait prompting to both these conditions. [5]

Moreover, both periodontitis and RA exist a disproportion between pro-inflammatory and anti-inflammatory cytokines, which is considered responsible for the damage of the tissue. [6]

## Materials and Methods

The samples composed of 60 female participants with age between (40-45) years, they were carefully informed about the aim of the study and they were free to accept or refuse to be examined.

The samples were divided into two groups:

Group I: Includes 30 healthy looking subjects without any signs and symptoms of any systemic disease or under any other medication.

Group II: consist of 30 patients with rheumatoid arthritis, were selected from subjects attending to the department of Rheumatology in Al- Sadar learning hospital in Al- Najaf city.

### Salivary Samples:

For each patient sample of stimulating saliva was collected between 9.00 am and 11 am, at least one hour after breakfast. Each patient was asked to chew a piece of Arabic gum (0.35- 0.4 GM) for one minute then remove all saliva by expectoration. Chewing was continued for five minutes, with the same piece of gum and saliva collected in sterile screw capped bottle. After the collection and

the disappearance of salivary foam, the pH of saliva was measured within 15 minutes using a digital pH meter and the rate of secretion was expressed as milliliter per minute (ml/min).

### **Periodontal Health Assessments**

Oral examination was carried out on dental chair using plane mouth mirror and dental explorer for detection of gingival inflammation, in addition to blunt probes (William periodontal probe) for the measurement of the probing pocket depth (PPD) and loss of attachment (L.A), measurement of the pocket depth represent the distance in millimeters from the gingival margin to the most apical extent of the probe inserted to the gingival crevice as close as possible to the axis of the tooth was measured [6] while loss of attachment(L.A) represent the distance between cement-enamel junction(CEJ) and the base of the pocket was measured to the nearest millimeter with calibrated periodontal probe, measurement was made following criteria of Ramfjord, the distance was measured indirectly by subtracting the distance from the gingival margin to the cement-enamel junction (CEJ) from probing pocket depth[7], all permanent teeth were examined for recording of dental plaque, gingival condition, calculus and clinical pocket depth, the examination started with the buccal surface of the tooth and followed by the mesial, lingual and distal surfaces[8]). The periodontal parameters included a plaque index (Pl. I) [9], calculus index (CAL.I) [10], gingival index (G.I) [11] and Ramfjord index for the loss of periodontal attachment.

### **Statistical analysis**

Statistical analysis was done by using SPSS (statistical package for social science) version 19.

P value equal to or less than (0.05) level of significance was considered to be statistically significant. The confidence limit was accepted at 95%. [12]

### **Results**

A total of 60 subjects had been included in this study, thirty of them were healthy persons and thirty others were with rheumatoid arthritis. The result showed that there was not a statistically significant difference between RA study and control groups in salivary pH, while there is a significant decrease in salivary flow rate among RA (study) group when compared to control group as shown in table (1)

**Table (1): Mean and standard deviation of Salivary pH and flow rate of the study samples.**

<b>GROUPS</b>	<b>pH</b>	<b>Flow rate ml/min</b>
<b>Study group</b>	7.15±0.42	0.74±0.34
<b>Control group</b>	7.41±0.20	1.13±0.20

The mean values and standard deviation of plaque, gingival, calculus indices, in addition to the pocket depth and loss of attachment are shown in table (2,3,4,5 and 6 ). For all, results showed the higher values of the total samples were observed among the study groups as compared to the control group with highly significant differences ( $P < 0.01$ ).

**Table (2) Mean and standard deviation of plaque index ( PL.I) of the study samples**

<b>GROUPS</b>	<b>PL.I mean</b>	<b>SD</b>	<b>P VALUE</b>
<b>Study group</b>	1.75	0.18	<0.001*
<b>Control group</b>	1.19	0.08	

**Table (3) Mean and standard deviation of gingival index (GI.I ) of the study samples**

<b>GROUPS</b>	<b>GI.I mean</b>	<b>SD</b>	<b>P VALUE</b>
<b>Study group</b>	1.49	0.10	<0.001*
<b>Control group</b>	0.99	0.21	

**Table (4) Mean and standard deviation of calculus index (CAL.I) of the study samples**

<b>GROUPS</b>	<b>CAL.I mean</b>	<b>SD</b>	<b>P VALUE</b>
<b>Study group</b>	0.83	0.18	<0.001*
<b>Control group</b>	0.16	0.04	

**Table (5) Mean and standard deviation of probing pocket depth (PPD) of the study samples**

<b>Group</b>	<b>PPD mean</b>	<b>SD</b>	<b>P VALUE</b>
<b>Study group</b>	3.63	0.11	<0.001*
<b>Control group</b>	2.59	0.15	

**Table (6) Mean and standard deviation of loss of attachment (L.A) of the study samples**

<b>Group</b>	<b>L.A mean</b>	<b>SD</b>	<b>P VALUE</b>
<b>Study group</b>	2.10	0.22	<0.001*
<b>Control group</b>	0.55	0.90	

\* Highly significance

SD: standard deviation

Pl I: plaque index

G I: gingival index

CAL I: calculus index

PPD: probing pocket depth

## Discussion

Rheumatoid arthritis is an autoimmune disease that distresses several organs and it is also associated with the joint destruction, connective tissues and bones. Both periodontitis and RA denote an imbalance between pro-inflammatory and cytokines anti-inflammatory cytokines, which are supposed responsible for damage of the tissue [2] It seems that a related immunological response occurs in periodontal disease (PD) and RA since increase the level of some cytokines in both the diseases has been detected [12].

In the current study the salivary flow rate was found to be significantly lower in RA patients than the control groups and thus agree with [13] who found that lymphocytes infiltrate of affected gland resulting in decrease salivation and

chemical changes, methotrexate is among chemotherapy agents that cause reduce salivary flow rate, while there is no significant difference in salivary PH between two groups and thus in agreement with [14].

The result of the study displayed that there was a highly significant difference between study (RA) group and control group regarding the plaque index (Pl.I) and thus agree with [15] who found that this result could be connected to the hands muscles stiffness to attained good oral hygiene among (RA) patients, the alterations occurring in the RA patients life style as hands muscle function decreases and lead to unsuitable mechanism of oral hygiene have been reflected as a reason for relationship between RA and periodontitis. Also there is a highly significant difference in (GI) between RA and normal subjects and this could be associated to the increase in plaque in RA patients because of the plaque is the relevant factor of the gingival inflammation and this agree with the previous study.

Also there is a highly significant difference in Cal. I between RA and non RA subjects and thus agree with [15] who found that rheumatoid arthritis play a major key role in periodontal disease and patients with rheumatoid arthritis have suffer with dis-regulation of inflammatory response and increased all periodontal explanations due to numerous mechanisms. Many of these patients become more or less immobilized as a results of impairment of the functional hand that leads to proliferation oral hygiene index such as calculus index.

The mean value of PPD in RA group was significantly higher compared to non RA group, this elevation in the PPD could be correlated to local and systemic factors, the local factors are the dental plaque which was significantly higher in the RA group and this will stimulus PPD in this group, while the systemic factors in the RA patients is the deficiency in immune system and thus agree with [16].

The result of the present study shows that there was a highly significant difference between RA and control groups regarding loss of attachment (**L.A**) and thus result in agreement with [17] who proved that a highly incidence of periodontal disease in RA patients disturbing the hard and soft tissues surrounding teeth and the causative factor of this disorder is the plaque with its bacterial biofilm. The inflammatory process set upon due to this biofilm may result in damage of the periodontal ligament and the alveolar bone. If the state persists or progress, the attachment apparatus of the tooth is affected that the tooth becomes loosened in the socket and eventually exfoliate.

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## الحالة الصحية اللثوية والمعلّمات اللعابية بين مرضى التهاب المفاصل الروماتيزمي في مدينة النجف.

### الخلاصة

**المقدمة:** التهاب اللثة (PD)، من أمراض الفم الأكثر شيوعاً، هو مرض مدمر للأنسجة الأسنان الرابطة وسببه مجموعة من الكائنات الحية الدقيقة المحددة اللثوية *Aggregatibacter actinomycetem*، *Tannerella*، *Porphyromonas Prevotella* هذه الحالة يعود اليها تدمير كلا الأنسجة الضامة والعظم السنخي بسبب التهاب اللثة المزمن. النتائج السريرية للالتهاب اللثة من تآكل العظم السنخي وفقدان الروابط النسيجية حول الاسنان هي نتيجة التعديلات التي تتوسط فيها الالتهابات للتوازن واعاده تشكيل العظام. ارتشاح التهابات بين طبقه البلاك (الجير) والعظم السنخي والأنسجة الضامة تقيم استجابة المضيف المناعية للبكتريا. نواتج المضيف الأنزيمية والمواد التي تحلل المواد خارج الخلية مما تقود الى تآكل بالعظم السنخي مما ينتج عنه خساره لا رجعه فيها من فقدان الأنسجة الضامة.

**المواد وطرائق العمل:** العينات تتكون من 60 مشاركاً من الإناث (30 بحاله صحيه طبيعیه و 30 يعانون من الروماتيزم الرثوي) مع التقدم في السن ما بين (40-45) سنة. تم تقييم الوضع الصحي للثة لكلا المجموعتين عن طريق قياس عمق الجيب اللثوي، فقدان الانسجة الرابطة، مؤشر الصفيحة الجرثومية، مؤشر الكلس، مؤشر التهاب اللثة. عينات اللعاب تم تجميعها لكلا المجموعتين بعد تعرض المشاركين لعملية تحفيز اللعاب وقياس PH اللعابية ومعدل تدفق اللعاب بالنسبة لهم.

**النتائج:** اظهرت مجموعه الروماتيزم الرثوي فرقا كبيرا جدا في عمق الجيب اللثوي، مؤشر الصفيحة الجرثومية، مؤشر التهاب اللثة، مؤشر الكلس، معدل فقدان الانسجة الرابطة مقارنة مع المجموعة الطبيعية الاخرى بينما وجد هناك نقصان واضح في معدل تدفق اللعاب في مجموعه الروماتيزم الرثوي مقارنة مع مجموعه السيطرة في حين لم يوجد اي فرق ملحوظ في PH اللعابية بين المجموعتين.

**الاستنتاج :** تقدم نتائج هذه الدراسة دليلاً على وجود علاقة ذات دلالة إحصائية عالية بين التهاب المفاصل الروماتيزمي وأمراض اللثة، وهذا قد يكون راجعاً إلى الطبيعة الفيزيولوجية المرضية المماثلة لكلا المرضين.

**الكلمات المفتاحية:** امراض اللثة، التهاب المفاصل الروماتيزمي، فقدان الانسجة الرابطة، عمق الجيب، مؤشر البلاك، مؤشر اللثة، معدل تدفق اللعاب.