Periodontal status and salivary flow rate among diagnostic radiology department workers

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ABSTRACT

Background: diagnostic radiology field workers are at elevated risk level for systemic and oral diseases like periodontal diseases. This study was aimed to estimate the periodontal condition and salivary flow rate among diagnostic radiology workers.

Material and method: The sample for this study consisted of a study group radiographers (forty subjects) working for 5 years at least and control group consisted of nurses and laboratory workers away from radiation (forty subjects) in Baghdad hospitals. All the 80 subjects aged 30-40 year-old and looking healthy without systemic diseases. Plaque, gingival, periodontal pocket depth and clinical attachment loss indices were used for recording the periodontal conditions. Under standardized conditions, collection of unstimulated salivary samples was done and salivary flow rate was measured.

Results: Although not significant statistically ($p>0.01$), analysis of the present study data showed that plaque and gingival indices were higher among radiographers. While periodontal pocket depth and clinical attachment loss were higher among radiographers than control group with statistically highly significant difference ($p<0.01$). On the other hand salivary flow rate was lower among radiographers than control group with statistically highly significant difference ($p<0.01$).

Conclusions: Ionizing radiation affects salivary flow rate and this in turn will affect periodontal status.

Keywords: Diagnostic radiology, salivary flow rate, periodontal condition. **(Received: 15/9/2018; Accepted: 15/10/2018)**

INTRODUCTION

From all artificial sources, medical radiation use represents 98 %, and accounts 20% of the total population exposure. Each year worldwide, more than 3000 million examinations are done using diagnostic radiology, carrying out millions of nuclear medicine procedures and millions of radiotherapy treatments [1]. Radiological technologists exposed to radiation about two times higher than other occupation groups in the fields of diagnostic radiation workers, such as physicians, dentists, dental hygienists, and nurses [2]. In addition, number of persons who work in nuclear medicine and diagnostic radiology departments increased during the last years [3].

Oral hygiene means the degree of cleanliness of oral cavity. Good oral hygiene is necessary to prevent common oral diseases (dental caries and periodontal disease) [4]. Periodontal diseases are most common chronic infectious diseases leading to the gingival and / or periodontal tissues inflammation in addition to advanced loss of alveolar bone and basically they divided into two types, gingivitis and periodontitis.

Their initiation comes from dental plaque with the inflammatory character aid [5,6].

In teeth included in high-dose radiation fields, the increase in loss of tooth and higher loss is seen and higher periodontal parameters found among people exposed to radiation as workers or patients might be due to reactive oxygen species and changes in microflora [7- 9].

Major and minor salivary glands located in and around the mouth secrete a mixture of secretions which is circulating in the mouth as a clear viscous fluid called saliva this definitely promotes oral health [10].

Tolentino *et al.*[11] stated that radiation alters the salivary composition, making it with higher viscosity, lowering buffering capacity, changing the electrolytes concentration, and altering its immune and nonimmune antibacterial systems. Grundmann *et al.*[12] reported that one week of continuous radiation changes salivary composition.

This study was conducted to estimate oral health status (gingival index, plaque index, periodontal pocket depth and clinical attachment loss) and their relation to the salivary flow rate among a group of diagnostic radiation workers in comparison with workers in other departments from same hospitals.

MATERIALS AND METHODS

The human sample for this study consisted of 80 men aged 30-40 years old. The study group included 40 men working for at least 5 years in

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the diagnostic radiology department and a control group included 40 men working as nurses or in laboratory away from radiation and all the 80 men worked in Baghdad hospitals with no systemic diseases. They are nonsmokers and taking no any medication or even dietary supplements.

Clinically, plaque index (PlI)[13], gingival index(GI) were measured [14]. Using calibrated periodontal probe (Williams probe), the probing pocket depth (PPD) and clinical attachment loss (CAL) indices were assessed [5]. Unstimulated salivary samples were collected in the morning (9-11 A.M) under standardized condition for each participant [15]. The collected volume of saliva in milliliter (ml) was divided by the time required for the collection in minute (min) in order to calculate salivary flow rate [16].

Analysis of data was conducted by application of SPSS program (SPSS version 24) using independent sample t-test, means and Pearsons correlation coefficient test.

RESULTS

Table 1 showed the findings of this study which revealed that the mean value of plaque and gingival indices were higher among study group than that of the control group with no statistically significant difference ($p>0.05$). Oral examination showed higher periodontal pocket depth and clinical attachment loss among study group than those among control group with statistical highly significant difference between them ($p<0.01$).

Table1: Periodontal parameters among study and control group.

Variable	Group				Statistical difference	
	Study		Control			
	Mean	±SE	Mean	±SE	t-test	P-value
PlI	1.130	0.048	1.069	0.024	-1.126	0.264
GI	0.876	0.088	0.829	0.112	-0.328	0.744
PPD	3.340	0.295	0.613	0.234	-7.251	0.000**
CAL	1.614	0.190	0.293	0.119	-5.903	0.000**

****Highly Significant at (p<0.01).**

Table 2 illustrated that for the study group salivary flow rate was lower than that for the control group with statistically highly significant difference ($p<0.01$).

Table 2: Salivary flow rate among study and control group.

variable	Group				Statistical difference	
	study		control			
	Mean	±SE	Mean	±SE	t-test	P-value
flow rate	0.192	0.010	0.358	0.014	9.545	0.000**

****Highly Significant at (p<0.01)**

As revealed in Table3 the correlations between periodontal parameters and salivary flow rate. Negative correlations were detected between salivary flow rate and PII and between salivary flow rate with GI in study group, and between salivary flow rate with PPD and CAL in both study and control groups; on the other hand Positive correlation between salivary flow rate and PII and between salivary flow rate with GI in Control group. All these correlations were not significant statistically ($p>0.05$).

Table3: Correlation between Periodontal parameters and salivary flow rate among study and control group.

Variables				PlI	GI	PPD	CAL
Group	Study	FR	r	-0.251	-0.190	-0.076	-0.140
			p	0.118	0.240	0.643	0.388
	Control	FR	r	0.095	0.272	-0.188	-0.121
			p	0.558	0.090	0.246	0.457

DISCUSSION

The present study findings showed higher gingival, periodontal pocket depth and clinical attachment loss indices among the study group than those for control group. This came in agreement with other previous study [9] who found higher level of deep periodontal pockets among the irradiated subjects if compared to the non-irradiated subjects and also agreed with Radwa study [8] in which a higher gingival & periodontal indices among workers of radiology this may be caused by reduced salivary flow rate among those workers than among the control group as analyzed in the current study, this agree with other study [11] which found salivary glands damage that came from head and neck radiotherapy commonly, so salivary composition changed and the salivary flow rate decreased. Periodontal diseases and infections increased by dropping bacterial clearance and the effect on microbial homeostasis caused by reduced salivary flow rate as a risk factor [17] ,this could explain the negative correlations between periodontal parameters and salivary flow rate among the study group. Increases in reactive oxygen species among radiology department workers as stated by another study [18] could be an additive cause for exaggerated periodontal diseases. Reduced immunity among study group could be another good explanation since Radwa[8] reported reduced secretory immunoglobulin A level among radiology workers.

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الخلاصة

الخلفية: يتعرض العاملون في مجال الإشعاع التشخيصي لخطر الإصابة بأمراض جهازية وأمراض الفم مثل أمراض اللثة. كان الهدف من هذه الدراسة هو تقدير حالة اللثة ومعدل تدفق اللعاب بين العاملين في مجال الإشعاع التشخيصي.

المادة والطريقة: تكونت عينة الدراسة من مجموعة من العاملين في التصوير الشعاعي (أربعين متطوع) يعملون لمدة خمس سنوات على الأقل ، وكانت المجموعة الضابطة تتألف من الممرضين والعاملين في المختبرات بعيدا عن الإشعاع (أربعون متطوع) في مستشفيات بغداد. جميع ال 80 متطوع تتراوح أعمارهم بين 30-40 عاما ويبدون صحيا دون أمراض جهازية. تم استخدام مؤشرات الصفيحة الجرثومية ، اللثة ، عمق الجيوب اللثوية و فقدان الانسجة الرابطة لتسجيل حالة اللثة. أخذت عينات من اللعاب غير المحفز في ظل ظروف موحدة وتم قياس معدل تدفق اللعاب.

النتائج: أفاد تحليل البيانات من الدراسة الحالية أن اللويحات ومؤشرات اللثة كانت أعلى بين المصورين على الرغم من أنها لم تصل الى حد الفرق المعنوي (p> 0.01)، وعمق الجيوب اللثوية وفقدان ارتباط اللثة كانت أعلى بين التصوير الشعاعي من المجموعة الضابطة ذات فرق معنوي عالي (p < 0.01). من ناحية أخرى كان معدل التدفق اللعابي أقل بين عاملي التصوير الشعاعي من المجموعة الضابطة مع فرق معنوي عالي(P <0.01).
الاستنتاجات: الإشعاع المؤين يؤثر على معدل تدفق اللعاب وهذا بدوره سوف يؤثر على حالة اللثة.