Periodontal health status of patients with Maxillary Chronic Rhinosinusitis (Part 1: Clinical study)

Sohair Mohammed Zaki, B.D.S [(1)]
Maha Abdul-Aziz Ahmed, B.D.S., M.Sc. [(2)]
Husam Majeed Hameed, M.B.Ch.B, C.A.B.S, Ph.D. [(3)]

ABSTRACT

Background: Periodontal diseases (PD) are inflammatory conditions of the tissues supporting the teeth, most often gingivitis and periodontitis. Maxillary chronic rhinosinusitis (MCRS) is the inflammation of the maxillary sinuses which is last for at least 12 consecutive weeks duration. Aims of study: Distribution of periodontal diseases among patients with Maxillary chronic rhinosinusitis according to gender and age.

Materials and methods: Males and females subjects (25-45 years), divided into two groups; 150 patients suffer from MCRS and 130 subjects without MCRS. Clinical periodontal parameters; Plaque Index (PL.I), Gingival Index (G.I), Probing Pocket Depth (PPD), Clinical Attachment Level (CAL) and Bleeding On Probing (BOP) recorded for four sites per tooth except third molars for all subjects, according to this examination groups were divided into four subgroups: clinically Healthy periodontium, Gingivitis, Chronic periodontitis CP.1, when PPD mean is (4-6 mm) and CP.2, when it is (> 6mm).

Results: (75.33%) of patients with MCRS had periodontal diseases, highest percentage (48%) had Gingivitis, number of females more than males, percentages of females with clinically Healthy periodontium and Gingivitis were higher. Subjects without MCRS demonstrated highest percentage (56.92%) with clinically Healthy periodontium. Significant and highly significant differences between the 2 groups in PL.I, G.I, PPD and CAL at all subgroups except BOP score1 revealed non significant differences.

Conclusion: 75.33% of patients with MCRS have periodontal diseases with greater PL.I, G.I, PPD and CAL when compared with subjects without MCRS. There is relation between periodontal diseases and MCRS.

Key words: Periodontal diseases, Maxillary chronic rhinosinusitis. **(J Bagh Coll Dentistry 2018; 30(2): 59-65)**

INTRODUCTION

The PD are inflammatory disorders result in damage of the tissues supporting the teeth [(1)]. Gingivitis is the inflammation of gingival tissues without attachment loss [(2)]. Periodontitis results when progressive damage of the alveolar bone and periodontal ligament with periodontal pocket formation, gingival recession, or both, and the presence of clinically detectable attachment loss. Diagnosing of periodontitis by examination of clinical periodontal parameters,
which are PPD, CAL, BOP and bone resorption determined by radiograph[(3)], the most common form of periodontitis is chronic periodontitis (CP) its prevalence is high in adults at age more than 35 years[(4)]. Maxillary chronic rhinosinusitis (MCRS) is the inflammation of the maxillary sinuses which lasts for at least 12 consecutive weeks duration. Dental plaque acts as reservoir for colonization of respiratory pathogens which can be shed into saliva, as well as oral bacteria can be cultured from lung fluid in a significant proportion [(5)]. Advanced PD may cause thickening of the mucosa of maxillary sinus while this thickness could decrease by periodontal therapy [(6)].

(1)Dentist specialty,specialized health center in Wasit
(2)Professor, Department of Periodontics, College of Dentistry, University of Baghdad
(3) Assistant Professor, Department of Surgery, College of Medicine, University of Wasit

There is double increase in maxillary sinus disease in patients with PD so; there is a causal relationship [(7)]. Therefore it was decided to conduct this study to find the correlation between MCRS and PD clinically.

MATERIALS AND METHODS

The subjects (males and females) collected from ENT out patients clinic in AL-Karama Teaching Hospital in AL- KUT \ Wasit\ Iraq, they were divided into 2 groups, the first group composed of 150 patients with MCRS examined endoscopiccally by ENT specialist at age range between 25-45 years, while the second group included 130 subjects without MCRS in the same range of age. Inclusion criteria included patients with bilateral MCRS ≥12 weeks and at least 20 teeth present. While the exclusion criteria included; smokers or alcohol drinkers, pregnant ladies, on contraceptive pills or hormonal medication, on anti-inflammatory or anti-microbial therapy and who have undergone periodontal treatment during 3 months prior to the study, presence of removable or fixed appliances, subjects without maxillary posterior teeth or complaining of unilateral MCRS and systemic diseases. Clinical periodontal parameters examination was performed for all subjects by using Michigan O periodontal probe on four surfaces (mesial, buccal/labial, distal and lingual/palatal) of all teeth except third molar.

These included: 1. Assessment of soft deposits by Plaque Index System (PL.I) [8]. 2. Assessment of Gingival Inflammation by Gingival Index System (G.I) [9].3. Assessment of Gingival Bleeding on Probing (BOP) [4] .4. Assessment of Probing Pocket Depth (PPD).5. Assessment of Clinical Attachment Level (CAL). According to this examination the periodontal health condition of each subject fit into one of the four subgroups: 1. Healthy subgroup: subjects with clinically healthy periodontium, this was defined by absence of any signs and symptoms of gingival inflammation and without periodontal pockets or clinical attachment loss. 2. Gingivitis subgroup: subjects with gingivitis which defined by presence of signs and symptoms of gingival inflammation and without periodontal pockets or clinical attachment loss. 3. CP.1 subgroup: subjects with chronic periodontitis and the mean of PPD is (4-6 mm). Mean= Sum of PPD/No. of pockets. 4. CP.2 subgroup: subjects with CP with mean of PPD are (> 6mm). Note: the presence of at least four sites with PPD ≥ 4 mm plus clinical attachment loss of (1-2) mm or greater defined as CP [10]. Statistical analysis by using of Mean (M), Standard Deviation (±SD), percentages, t-test. Graphical presentation by using column charts. All the statistical analysis are significant (S) at P-value ≤ 0.05, highly significant (HS) at P-value ≤ 0.01 and non-significant (NS) at P-value > 0.05. We certify that this study involving human subjects is in accordance with the Helsinky declaration of 1975 as revised in 2000 and that it has been approved by the relevant institutional Ethical Committee.

RESULTS

Table (1), revealed that the percentages of patients with MCRS of healthy subgroup was (24.67%) while, the others (75.33%); the highest percentage (48%) had gingivitis while, (24%) had CP.1 which almost equal to that of Healthy subgroup, but very little percentage at CP.2 subgroup only (3.33%). The highest percentage of females and males were in Gingivitis subgroup (52.43%) and (42.64%) respectively. The percentages of females were higher than males in Healthy and Gingivitis subgroups, while the percentages of males were higher in CP.1 and CP.2 subgroups. The total number of females (82) which was higher than males (68). The least mean of age was in Healthy subgroup (32.97) and highest was in CP.2 subgroup (41.4). From table (2), the highest percentage of subjects without MCRS was in Healthy subgroup (56.92%) followed by the Gingivitis subgroup then CP.1 subgroup and lastly CP.2. The highest percentages of males and females were in Healthy subgroups (58.9%) and (54.83%) respectively and the least percentages were in CP.2 subgroups (2.9%) and (4.84%) respectively. The percentages of males were higher than females in Healthy and CP.1 subgroups but the percentages of females were higher in Gingivitis and CP.2 subgroups. There was no much difference between males (68) and females (62) total numbers. The total mean of age was (37.32). In figure (1), the percentage of Healthy subjects was greater in subjects without MCRS than the patients with MCRS groups, while the percentages of patients with Gingivitis and CP.1 were higher in patients with MCRS group than the subjects without MCRS group. And almost equality in percentages of patients with CP.2 in both groups. As observed in table (3), the CP.2 subgroup of patients with MCRS showed the highest mean values of PL.I and G.I among the four subgroups, the mean and SD were (2.3 ± 0.38) and (2.1 ± 0.26) respectively, the same results were demonstrated regarding the PPD, CAL and BOP score1, hence the mean and SD were (6.83 ± 0.1), (2.59 ± 0.28) and (0.97±0.16) respectively. Table (4), demonstrated that the CP.1 subgroup of subjects without MCRS showed the highest mean values of PL.I, G.I and CAL, the mean and SD were (1.62 ± 0.37), (1.63 ± 0.27) and (1.24 ± 0.27) respectively. While the CP.2 subgroup revealed the higher PPD and BOP score1, the mean values and SD were (6.4± 0.2) and (0.9±0.04) respectively. By using t-test in table (5), the comparison between patients with MCRS and subjects without MCRS subgroups about mean values of clinical periodontal parameters, demonstrated significant differences regarding the G.I in healthy and CP.2 subgroups. Moreover, highly significant differences were detected in PL.I at all subgroups, also in G.I of Gingivitis and CP.1 subgroups, in addition to PPD and CAL of CP.1 and CP.2 subgroups. Comparisons of mean values of sites with BOP score1in Gingivitis, CP.1 and CP.2 subgroups showed non significant differences. Figures (2,3,4,5) illustrated the mean values of clinical periodontal parameters at all subgroups of the patients with MCRS were higher than those of subjects without MCRS subgroups except BOP score1 revealed very little difference.

Table (1): Distribution of patients with MCRS according to age, gender and periodontal health status

Parameters	S.analysis	Healthy	Gingivitis	CP.1	CP.2	Total
Distribution of total No. of patients	No.	37	72	36	5	150
	%	24.67%	48%	24%	3.33%	100%
Male	No.	13	29	21	5	68
	%	19.13%	42.64%	30.88%	7.35%	100%
Female	No.	24	43	15	0	82
	%	29.27%	52.43%	18.3%	0	100%
Age	mean	32.97	33.319	36.94	41.40	36.157
	SD	7.55	7.003	6.66	4.98	

Table 2: Distribution of subjects without MCRS according to age, gender and periodontal health status

Parameters	S.analysis	Healthy	Gingivitis	CP.1	CP.2	Total
Distribution of total No. of patients	No.	74	30	21	5	130
	%	56.92%	23.076%	16.15%	3.84%	100%
Male	No.	40	14	12	2	68
	%	58.9%	20.57%	17.63%	2.9%	100%
Female	No.	34	16	9	3	62
	%	54.83%	25.8%	14.53%	4.84%	100%
Age	mean	31.135	37.17	40.38	40.6	37.32
	SD	4.396	6.06	5.30	7.23	

Table 3: Descriptive statistics of clinical periodontal parameters according to subgroups of patients with MCRS

Patients with MCRS subgroups	PL.I		G.I		PPD		CAL		BOP/score 0		BOP/score1	
	mean	SD	mean	SD	Mean	SD	mean	SD	mean	SD	mean	SD
Healthy	0.35	0.08	0.33	0.08	-	-	-	-	-	-	-	-
Gingivitis	0.68	0.13	0.70	0.24	-	-	-	-	0.79	0.15	0.21	0.19
CP.1	2.13	0.36	1.88	0.38	5.08	0.52	1.92	0.59	0.18	0.03	0.82	0.21
CP.2	2.33	0.38	2.10	0.26	6.83	0.10	2.59	0.28	0.03	0.01	0.97	0.16

Table (4): Descriptive statistics of clinical periodontal parameters according to subgroups of subjects without MCRS

Subjects without MCRS subgroups	PL.I		G.I		PPD		CAL		BOP/score0		BOP/score1	
	mean	SD	mean	SD	Mean	SD	mean	SD	mean	SD	mean	SD
Healthy	0.30	0.10	0.28	0.10	-	-	-	-	-	-	-	-
Gingivitis	0.63	0.04	0.67	0.08	-	-	-	-	0.77	1.2	0.23	0.09
CP.1	1.62	0.37	1.63	0.27	4.41	0.19	1.24	0.27	0.17	0.04	0.83	0.07
CP.2	1.42	0.28	1.48	0.40	6.40	0.20	1.17	0.25	0.1	0.06	0.9	0.04

Table (5): Significance of differences in clinical periodontal parameters between patients with MCRS and subjects without MCRS subgroups

Subgroups	PL.I		G.I		PPD		CAL		BOPscore1	
	t-test	p-value Sig.	t-test	p-value Sig.	t-test	p-value Sig.	t-test	p-value Sig.	t-test	p-value Sig.
Healthy	3.03	0.003 HS	2.38	0.020 S	-	-	-	-	-	-
Gingivitis	3.05	0.003 HS	3.08	0.003 HS	-	-	-	-	0.00	1.00 NS
CP.1	6.38	0.000 HS	2.79	0.007 HS	6.57	0.000 HS	3.21	0.002 HS	1.26	0.217 NS
CP.2	4.24	0.004 HS	2.89	0.028 S	4.28	0.005 HS	4.17	0.009 HS	0.00	1.000 NS

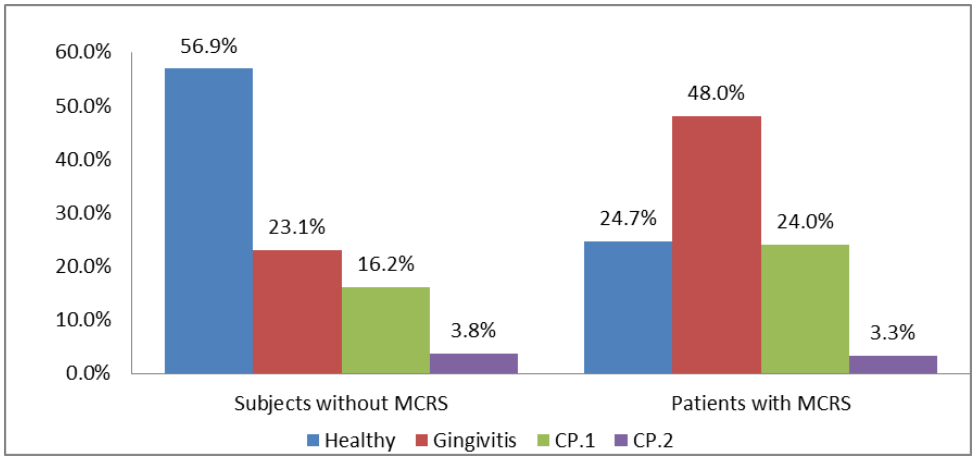

Figure 1: The percentages of subjects at each subgroup for subjects without MCRS and patients with MCRS

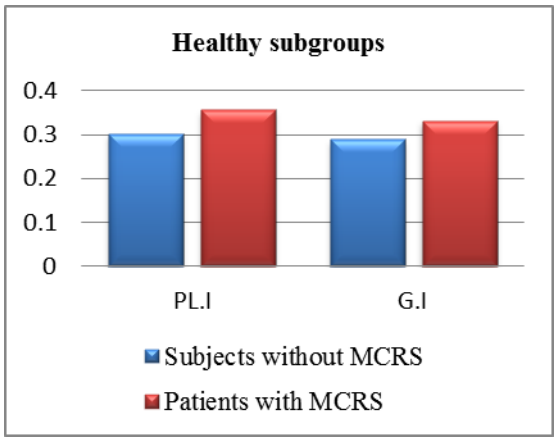

Figure 2: The differences in clinical periodontal parameters between subjects without MCRS and patients with MCRS at Healthy subgroups

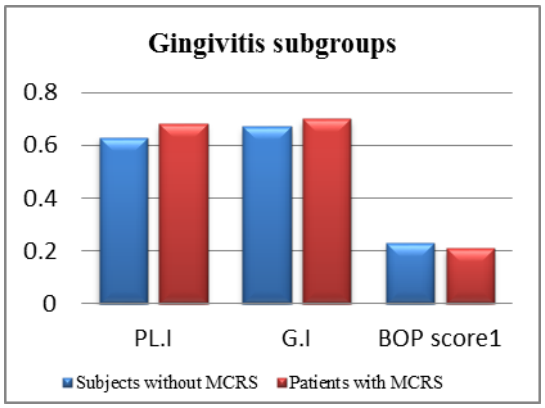

Figure 3: The differences in clinical periodontal parameters between subjects without MCRS and patients with MCRS at Gingivitis subgroups

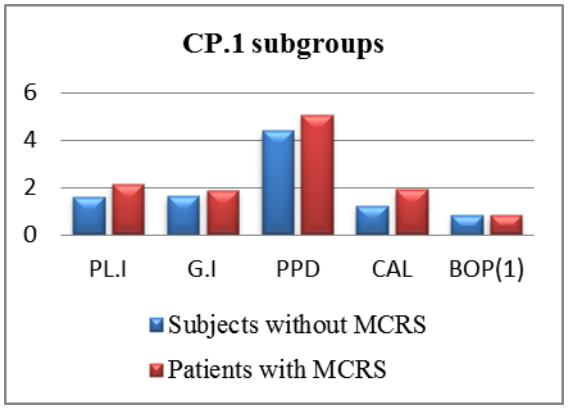

Figure 4: The differences in clinical periodontal parameters between subjects without MCRS and patients with MCRS at CP.1 subgroups

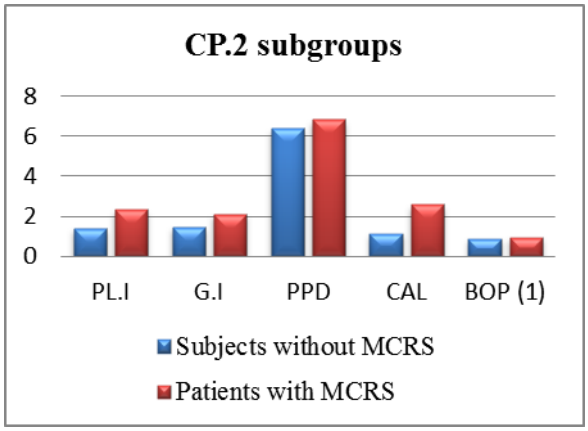

Figure 5: The differences in clinical periodontal parameters between subjects without MCRS and patients with MCRS at CP.2 subgroups.

DISCUSSION

From 150 patients with MCRS (75.3%) had PD, CP.1 (24%) and CP.2 (3.3%). These results were in agreement with the results of other study [11] who found that about 24% of 62 patients with MCRS had CP. Also Helene et al., 1988 [6], observed a relationship between PPD of the teeth affected with CP and the maxillary sinus mucosa thickness which is a sign of inflammation in sinuses. In addition, Sirikarn in 2012[12], showed that when there is severe loss of alveolar bone of maxillary posterior teeth there were triple chances to have thickening of maxillary sinus mucosa. Josef J. in 2013[13], observed that MCRS is a risk factor for CP. The higher percentage of Gingivitis over CP can be explained by the age limit of the study design because the progression of CP increases with age [4]. The highest mean of age (41.4) was in CP.2 subgroup and this is in agreement with Abbas A., 2010 [14] who found that the majority of patients expressing symptoms of CP were mainly between 40 and 60 years old. The number of females was 82 while males was 68 and this due to exclusion criteria which includes smokers and drinkers, hence they were in high percentages between males in area of research. The percentages of females in Healthy and Gingivitis subgroups were more than males, this is may be due to halitosis caused by MCRS [15] which makes adult females searching for periodontal treatment and carefully following instructions of oral hygiene, as well as females visiting dentist more than males and using tooth brush and interdental aids regularly because they were interested more about the appearance of their teeth. On the other hand the percentages of males with CP.1 and CP.2 were higher than females in patients with MCRS hence; the prevalence of destructive PD in males is higher than females [16]. While 130 subjects without MCRS, (56.9%) of them had clinically Healthy periodontium , (23.07%)of them had Gingivitis, (16.1%) had CP.1 and (3.8%) had CP.2 and these results in agreement with previous studies [17-19] who concluded that gingivitis and shallow pockets were of a moderate prevalence while deep pockets were of a low prevalence among adults population. The percentage of patients with CP.1 and CP.2 was 20 % and this is in accordance with Raitapuro et al., 2014 [20] who found that the prevalence of CP around (15%-30%) of most adult human populations. The highest mean of age was in CP.1 and CP.2 subgroups of subjects without MCRS and this is line with Agnihotram et al., 2010[21] who suggested that CP is high in adults at age more than 35 years. The percentages of Gingivitis and CP.1 of patients with MCRS subgroups were higher than those of subjects without MCRS subgroups, which indicated that there is a causal relationship between MCRS and PD [7]. In addition to Dan et al., in 2012 [22] who used Cone Beam Computed Tomography to indicate a correlation between maxillary sinus basal mucosal thickenings and CP of maxillary posterior teeth. Also Maryam in 2013[23] found inflammatory changes in the maxillary sinus in areas close to teeth with CP. Highly significant and significant differences were found between (PL.I G.I, PPD and CAL) in patients with MCRS and subjects without MCRS subgroups, but non significant differences in BOP score1, hence, there is no similar study to compare the results of this study with it but we can explain these alterations of PL.I, G.I, PPD and CAL by the presence of MCRS as a cause of mouth breathing which lead to dehydration of oral cavity and increase of plaque accumulation due to decrease of salivary wash hence, saliva plays a major role

in decreasing of plaque aggregation by cleaning the exposed oral surfaces mechanically, and buffering acids produced by bacteria. In addition to that the antibodies present in saliva may impair the ability of bacteria to attach to mucosal or dental surfaces [4]. Most cases of untreated MCRS cause difficulty in maintenance of oral hygiene due to mouth breathing of patients with MCRS, and because of close proximity of maxillary sinus cavity to the maxillary posterior teeth, oral health condition is one of the important factors of initiation of MCRS [24].

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الخلاصة:

الخلفية: أمراض ما حول الاسنان هى مجموعة من حالات التهاب الأنسجة الداعمة للأسنان التى تنتج عن البكتريا وهي في معظم الأحيان التهاب اللثة والتهاب اللثة المزمن و التهاب الجيوب الأنفية للفك الاعلى المزمن هو التهاب الجيوب الأنفية الذي يستمرمدة ما لا يقل عن ١٢ اسبوع متتالي اهداف الدراسة تصنيف الحالة الصحية لانسجة ما حول الاسنان للمرضى المصابين بالتهاب الجيوب الانفية للفك العلوي المزمن وفق الجنس والعمر ومن خلال قياس مؤشرات انسجة ما حول الاسنان السريرية: مؤشر الصفيحة الجرثومية، مؤشر التهاب اللثة، مؤشر النزف عند التسبير، عمق جيوب اللثة ومستوى الانسجة الرابطة

المواد والطرق: الاشخاص المشاركون في الدراسة ذكور واناث قسموا إلى مجموعتين تتكون الأولى من١٥٠ مصابين بالتهاب الجيوب الانفية والثانية تتكون من ١٣٠ غير مصابين بالتهاب الجيوب الانفية ضمن المجموعة العمرية بين ٢٥-٤٥ سنة للمجموعتين تم قياس مؤشرات ما حول الاسنان السريرية : مؤشر الصفيحة الجرثومية، مؤشر التهاب اللثة، مؤشر النزف عند التسبير، عمق جيوب اللثة ومستوى الانسجة الرابطة سجلت لكل شخص بالدراسة ولاربعة اسطح في كل سن باستثناء الرحى الثالثة ثم تقسيمهم الى أربع مجموعات فرعية: (لثة صحية سريريا ، التهاب اللثة ، التهاب اللثة المزمن ١ عندما يكون متوسط عمق الجيب بين ٤-٦ ملم والتهاب اللثة المزمن ٢ عندما يكون متوسط عمق الجيب > ٦ ملم)

النتائج: كان ٣٣,٧٥ ٪ من مرضى التهاب الجيوب الانفية للفك الاعلى المزمن لديهم امراض لثة. التهاب اللثة هي أعلى نسبة ٤٨٪ بينما النسبة الاقل كانت لالتهاب اللثة المزمن ٢ (٣٣,٣ ٪) فقط و كانت نسبة الاناث في المجموعتين الفرعيتين الصحية والتهاب اللثة اعلى من نسبة الذكور بينما نسبة الذكور اعلى في التهاب اللثة المزمن. بينما في مجموعة غير المصابين بالتهاب الجيوب الانفية كانت نسبة صحي اللثة أعلى من المجموعات الفرعية الأخرى ٩٢. ٥٦ ٪ وليس هناك فرق كبير بين الذكور (٦٨) والإناث (٦٢). فروقات معنوية ومعنوية عالية في مؤشرات ما حول الاسنان السريرية بين المجموعتين بما في ذلك مؤشر الصفيحة الجرثومية، مؤشر التهاب اللثة، عمق جيوب اللثة ومستوى الانسجة الرابطة ما عدا فروقات غير معنوية في مؤشر النزف عند التسبير

الاستنتاج: ان المرضى المصابين بالتهاب الجيوب الانفية المزمن ٣٣,٧٥ ٪ منهم مصابين بامراض اللثة. مع ارتفاع في مؤشرات انسجة ما حول الاسنان السريرية بالمقارنة مع المجموعة الثانية ، توجد علاقة بين امراض اللثة والتهاب الجيوب الانفية للفك الاعلى المزمن.