GINGIVAL RECESSION IN NORTH SINAI GOVERNORATE: INCIDENCE, SEVERITY, DISTRIBUTION AND RISK INDICATORS

Ali Wahbi Ayoub [1*], Mohamed Assadawy [2], Abdelfattah Mahmoud Amer [3]

ABSTRACT

Objective: Gingival recession (GR) is a disorder affecting almost all middle and older-aged individuals to some extent; a study is needed to assess the epidemiology, of GR in North Sinai Egypt, concerning incidence, severity, distribution and risk indicators. **Subjects & Method:** A total sample of 1908 individuals from different parts of North Sinai governorate was assigned upon the last Egyptian population census. Data collection: a. Questionnaire: A descriptive questionnaire was filled. b. Clinical examination: GR was recorded with Miller's classification. Verbal and written consent was obtained. Data were analyzed using SPSS 20.0. **Results**: The prevalence of GR was 41.6 %; showed the highest distribution among age groups of 36-45 and 46 – 60 years old. The predominance of GR at posterior areas on both lower and upper arches was noted as these areas showed statistically significant more GR compared to anterior areas on the two arches (p < 0.05). **Conclusion:** The prevalence of GR is more in males than females. It was found to be more common in the maxillary posterior area than in other sites. Gender, age and oral hygiene are the major etiologic factors that affect GR incidence. Systemic conditions especially smoking are major risk factors in GR prevalence.

KEYWORDS: Gingival recession, Epidemiology, Risk indicators, North Sinai

INTRODUCTION

Gingival recession (GR) is an apical migration of gingival margin toward cemento-enamel junction (CEJ)[1], it may be localized or generalized; its clinical significance may attribute to exposed root surface which may be extremely sensitive. Pulp hyperemia can occur as a result of GR, and interproximal recession can lead to oral hygiene issues and plaque accumulation[2]. Excessive or inadequate tooth brushing, destructive periodontal disease, tooth malposition, alveolar bone dehiscence, high muscle attachment, and occlusal trauma have all been linked to the development of GR. Other causative factors were reported including: iatrogenic factors (orthodontic, or prosthetic treatment, and restorative and periodontal procedures) and smoking[3]. Osseous dehiscence, inadequate gingival width, over eruption, and age are some factors have reported[4,5]. Systemic diseases as leukemia and anemia should be taken into account in this regard[5]. Plaque index scores were increased with GR extent[6], although another study showed negative correlation between plaque deposition and GR[7]. Additionally, extent of

1. Masters Candidate, Department of Oral Medicine, Periodontology, Diagnosis and Oral Radiology Faculty of Dental Medicine, Boys, Cairo, Al-Azhar University
2. Associate Professor, Department of Oral Medicine, Periodontology, Diagnosis and Oral Radiology Faculty of Dental Medicine, Boys, Cairo, Al-Azhar University.
3. Professor, Department of Oral Medicine, Periodontology, Oral Diagnosis, and Oral Radiology, Faculty of Dental Medicine, Al-Azhar University, Cairo, Boys.

• *Corresponding author*: aliwahbia@gmail.com

GR increased with age was reported[8]. Despite the frequent observation in adult subjects, occurrence and severity of GR presents considerable differences between study populations. In 2014, Egyptian Ministry of Public Health, in collaboration with World Health Organization (WHO) country office, released results of research on oral health status in Egypt[9]. The findings revealed that nearly 80% of the participants had periodontal disease in some form. Gingival and periodontal problems are more common in diabetics and smokers, and 77% of those surveyed do not brush their teeth on a regular basis, 38 % have never brushed their teeth, and only 48 % use toothpaste. Because of the wide range of cases and clinical manifestations, it is not always possible to classify all GR defects using a single classification system[10]. Sullivan and Atkins classification[11] is one of the first classifications; which was based on the depth and width of the defect. It was straightforward, but it was subject to open interpretation of examiner and inter-examiner variability, making it unreliable. Miller classified GR into soft and hard tissues based on two factors: the size of the GR defects and the amount of hard and soft tissue loss in the interdental areas around the GR defects[12]. Cairo Classification[13] of GR is based on interdental clinical attachment loss as main parameter to define GR. This classification simplifies the classification of GR and emphasizes the importance of the interproximal attachment level as a site-related prognostic factor. The Kumar and Masamatti Classification[14] was created by combining certain criteria from Miller's classification with aspects from Nordland and Tarnow's classification. In addition, Nagappa &Mukta's Classification[15] system was more informative based on Miller's classification. It makes it simple to assess the progression of GR using anatomical landmarks that are easily visible.

Studies on the prevalence and occurrence of GR in various populations have been conducted; a prevalence of 90% was reported in older institutionalized subjects[16], 58% in a US study[17]. In Turkey[18], GR prevalence was 78.2 %, with 17.4% having GR on buccal surfaces measuring between 1 and 2 mm, and males having more GR sites than females. A high level of GR was linked to a lot of dental plaque and calculus, as well as male gender, smoking duration, tooth brushing frequency, traumatic tooth brushing, and a lot of frenum. A Brazilian study[19] found that GR1 mm affected 99.7% of subjects, while GR3 mm and GR5 mm affected 75.4 % and 40.7 % of subjects with one tooth, respectively. Significant risk factors for GR included advanced age, male gender, smoking exposure, poor self-reported oral hygiene, a history of periodontal treatment, and a high percentage of calculus.

The occurrence and levels of GR in two cohorts of individuals participating in parallel longitudinal studies in Norway (1969-1988) and Sri Lanka (1970-1990), covering the age range of 15 to 50 years, were described in a study conducted in two countries. GR had started early in life in the Norwegian cohort, affecting more than or equal to 60% of 20-year-olds and confined to buccal surfaces; by the age of 50, more than 90% of the group had GR. Greater than or equal to 30% of the Sri Lankan cohort had GR before the age of 20 years; by 30 years, 90% of the Sri Lankans had recession on buccal, lingual, and interproximal surfaces; and by 40 years, 100% of the Sri Lankans had recession[20].

In Tanzania [21], 33.6 % of people had GR 1 mm, while 82.8 % of people in a Polish study had GR (women 81.0 % and men 85.2 %). They discovered that GR was very common, and that there were links between oral hygiene, inflammation, and the occurrence of GR. In Finland[22] GR was found on at least one tooth surface in 68 % of subjects, with the average number of surfaces with recession being 7.2 for women and 10.4 for men, and subjects with GR having fewer natural teeth than those without. Mandibular teeth had more recession surfaces

than maxillary teeth, and recession sites were symmetrically distributed. Cross-sectional French survey[6] includes 2,074 subjects showed that a total of 84.6% of the sample had at least one GR. A multivariate linear regression model showed that age, gender, plaque index, and tobacco consumption were associated with the extent of GR. The number of missing teeth and gingival bleeding index were associated with GR severity.

In view of these, it is of importance to assess the epidemiology of this condition, identify the etiological factors, and establish preventive measures and treatment. In Egypt, information concerning oral health of population was found to be scarce. Hence,   present study was designed to estimate the prevalence, severity, distribution of GR and to assess the association of potential risk indicators with its occurrence in one of Egyptian governorates (North Sinai governorate). It is located in the north-eastern part of Egypt, and it encompasses half of the Sinai Peninsula by an area of 27,574 km^2 and total population of 475,000 person with density of 16.57/km*[23].

The aim of this study was to assess Incidence, Severity, Distribution and Risk indicators of GR in North Sinai.

PATIENTS AND METHODS

Study design: Descriptive analytical study

Subjects: The study sample included was based upon the figures of population of North Sinai governorate according to the last Egyptian population census.* Total number of population above 20 years in each area of the governorate was used in calculating the total sample[24]; calculated sample is presented in Table 1.

a. **Questionnaire:** A descriptive questionnaire was prepared including questions concerning age, socio-economic level, systemic and oral health status, smoking habits, information related to toothbrush type and tooth-brushing technique and frequency of each patient. Tooth-brushing frequency should be scored as follows: 1: less than once a day; 2: once a day and 3: twice a day or more.

TABLE (1) Data of the included sample.

Area	*Males above 20 years	*Females above 20 years	*Total population above 20 years	Males Estimated Sample Number	Females Estimated Sample Number	Total Estimated Sample
Arish	59176	54188	113364	398	382	780
Bir Al Abd	29392	29041	58433	241	231	472
Sheikh Zuweid	15589	15526	31115	151	147	298
Rafah	17839	17278	35117	93	89	182
Hasna	7090	6163	13253	71	62	133
Nakhl	2434	1881	4315	24	19	43
TOTAL	**131520**	**124077**	**255597**	**978**	**930**	**1908**

Data provided from **Central Agency for Public Mobilization and Statistics, Egypt.**

b. Clinical examination: Each patient received a full mouth examination for assessing gingival recession (site, severity, and distribution), dental plaque and calculus, and presence of traumatic tooth-brushing. Every subject was examined in a dental chair using dental chair light, mouth mirror, explorer, periodontal probe; the entire mouth was examined in a uniform pattern. Presence of gingival recession was recorded according the criteria of Miller's classification. This study was carried out during period of 2019-2020.

Data collection:

Ethical considerations: All subjects included were informed about the nature of the research and they were asked to give written consent, to participate in the study. A detailed verbal and written explanation of the purpose of the study was provided before their signature. The patients were advised that the diagnostic phase and treatment protocol would not adversely affect the outcome of treatment. (Ethical code: 120/123)

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (NY: IBM Corp) Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level. The used tests were: Chi-square test for categorical variables, to compare between different groups. Fisher's Exact or Monte Carlo correction: Correction for chi-square when more than 20% of the cells have expected count less than 5.

RESULTS

A total sample of 1908 subjects (978 males and 930 females) from North Sinai governorate, Egypt, was included; age range was 20 - 76 years old.

I. Results of clinical parameters recorded assessed Oral Health Status:

A. Total Included sample from the whole North Sinai: *The recorded data are illustrated in Figure (1).*
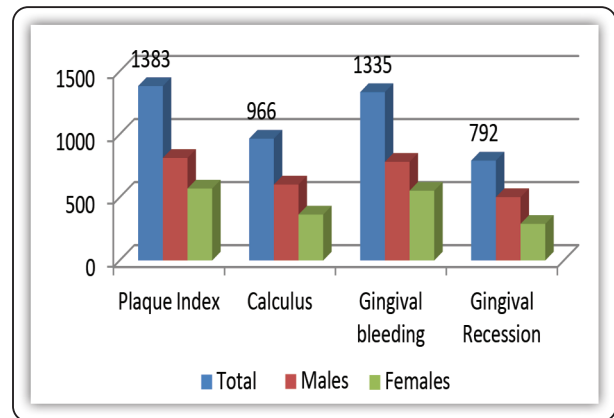

FIG (1) Findings of the recorded clinical parameters among the whole included sample from North Sinai, presented as total number and gender type.

B. Total Included sample from different geographic areas of North Sinai:

The recorded data from Al-Arish, Bir Al Abd, Sheikh Zuweid, Rafah, Al-Hasna, and Nakhl are presented in **(Figure 2)**.
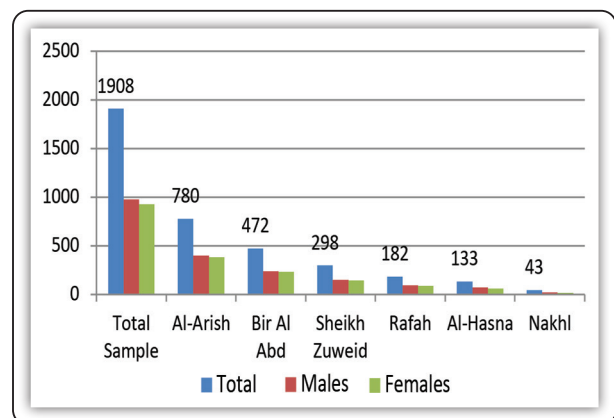

FIG (2) Frequency of GR among subjects from different geographic areas of North Sinai, presented as total number and gender type; no differences between males and females in all geographic areas.

II. *A. Results of Gingival recession distribution within dental arches of studied sample:*

Posterior area on both upper and lower arches showed statistically significant more gingival recession compared to anterior areas on the two arches (p<0.05).**(Figure 3)**
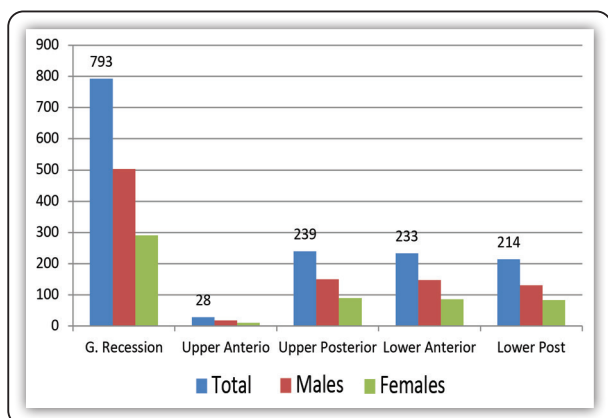

FIG (3) Findings of recorded gingival recession among included total sample from North Sinai governorate, presented as total number and gender type.

B. *Results of Gingival recession distribution in relation to age groups of studied sample:*

Age group between 36 – 45 years showed more localized gingival recession involving upper posterior area (Maxillary premolars-molars). Comparison showed that there was a statistically significant difference (p < 0.05) regarding predominance of gingival recession at posterior areas on both lower and upper arches. **(Figure 4)**
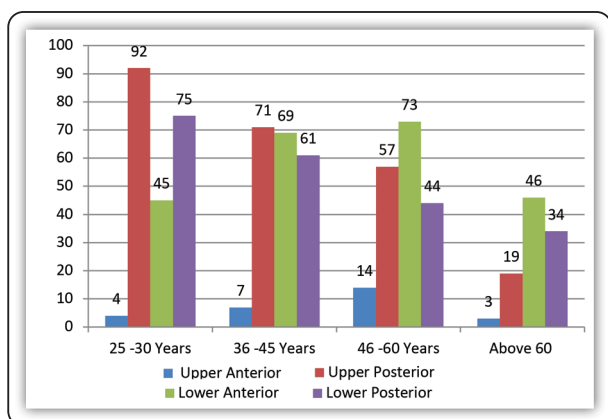

Fig (4) Frequencies of Localized Gingival Recession sites distribution according to age group.

III. Distribution of recorded clinical parameters according to age groups:

It can be seen that three clinical parameters (Tooth mobility, Furcation involvement and Gingival recession) showed the highest distribution among the age groups of 36 -45 and 46 – 60 years old when compared with their distribution among the other two age groups between 20 – 35 and above 60 years (p < 0.05). Comparison between the age group 36-45 and 46 -60 years showed no statistically significant difference (p > 0.05.). **(Figure 5)**
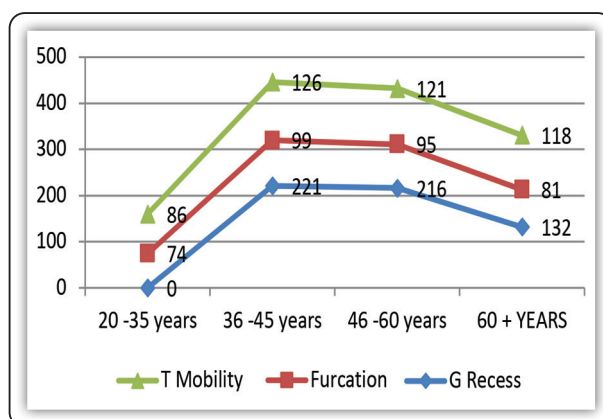

FIG (5) Line chart illustrating the results of clinical parameters (Teeth mobility, Furcation involvement and gingival recession) in relation to age groups, recorded from the whole included sample from North Sinai.

IV. Risk Indicators Results:

A.   Generalized (Systemic) Factors: Several systemic (generalized) factors that acknowledged as risk factors in incidence as well as severity of periodontal diseases and their manifestations were recorded. A total of 282 (from total sample included; 1908) subjects (14.78%) had diabetes mellitus, 444 (23.27%) were hypertensives. 9 subjects (0.047%) had Osteoporosis, 555 from the whole males included (n = 978), as it was so hard to obtain the number of females with this habit, (56.74%) were smokers, while 104 women from the total women included were pregnant (11.18%); Diabetes mellitus and Blood Hypertension had relatively high incidence rates. A relatively high percentage

were on anticoagulant therapy (n=220 from 1908; 11.53%). There was marked highly percentage of smokers habit as more than halve of included males with this habit; the more smokers were among the age groups up to 60 years **(Figure 6)**.
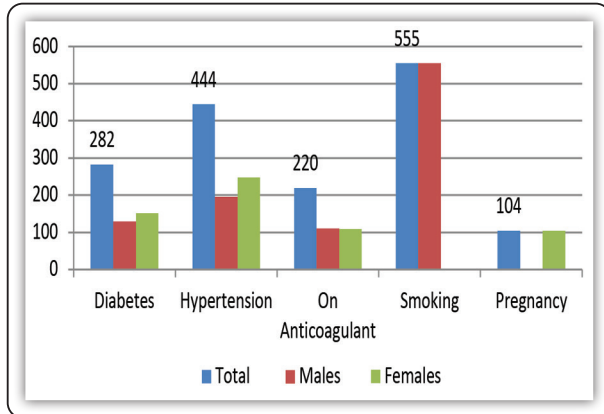

FIG (6) The distribution of various systemic conditions considered as risk indicators (factors) in incidence of periodontal disease.

B. **Localized (Oral) Factors:** Various conditions were considered as localized (oral) factors were considered as risk factors in incidence as well as severity of periodontal diseases such as tooth

brushing use, calculus deposits, clenching habit and mouth breathing; hence they were recorded. Regarding tooth brushing, total of 380 (from total sample included; 1908) subjects (19.92%) were used to brush their teeth regularly, 859 (45.02%) were used tooth brush frequently, while 669 (35.06) did not use tooth brush at all (Table 2 & **Figure 7**). Majority of included subjects were used medium tooth brush type **(Figure 8)**. Regarding the use of other tooth brushing aids, result showed that 166 (8.70%) used floss silk, 89 (4.66 %) used toothpicks, and only 49 (2.56%) were using Miswak **(Figure 9)**. Marked heavy deposits of dental plaque and calculus were recorded in 966 (50.62%) subjects (602 males and 364 females); males had more percentage of calculus deposition than females (61.55% and 39.14% for males and females respectively). Results showed that 279 subjects (14.62 %) were mouth breathers, with nearly same situation in both genders; no differences between males and females. Habit of clenching was reported in 212 subjects (11.11%) with no difference between males and females. Bad oral habits were found in 99 subjects (5.19%); again no differences between males and females (Table 2).

TABLE (2) The recorded localized (Oral) risk indicators (Factors) from the whole included sample

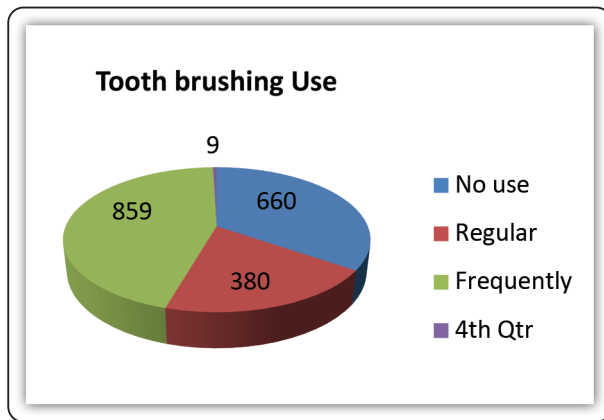| Age group	Gender	Tooth-brushing Use			Bad Oral Habits	Plaque / Calculus	Clenching	Mouth breathing
		Regular	Frequent	No use				
25- 35	M	67	108	189	23	193	49	68
	F	66	145	99	29	87	34	71
36 -45	M	40	90	103	13	142	33	39
	F	54	182	40	16	104	23	42
46- 60	M	36	134	89	7	181	32	25
	F	58	153	23	8	107	21	16
60 +	M	33	10	79	5	86	15	10
	F	26	37	47	8	66	14	8
Total		**380**	**859**	**669**	**99**	**966**	**212**	**279**

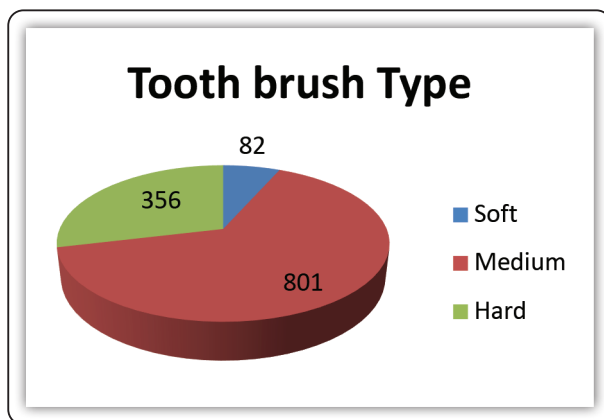FIG (7) The use of tooth brushing among the whole included sample.

FIG (8) The used types of tooth brushes by the whole included sample.
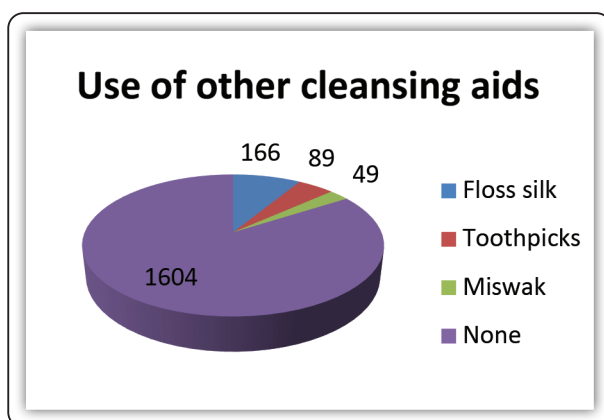

FIG (9) The use of other tooth cleansing aids with brushing among the whole included sample.

DISCUSSION

Epidemiology of any pathologic entity is useful means to establish the treatment needs and ensuring the preventive measures. It covers the correlation process between two or more findings and facilitates the understanding of cause and effect relationship of pathological problems that may affect the population. However, such correlations did not mean the actual presence of cause and effect relationships, but only mean the existence of a relationship between them. Majority of information in the field of epidemiology regarding several pathologies affecting dental/oral areas depending mainly on studies performed in populations all over the world and not the geographic area of concern; as epidemiologic researches in several countries seems to be deficient. Thus, it will be a hard task to find clear, firm as well as reliable data from oral epidemiological studies performed in various Arabian countries. Hence, the present work was designed and performed in attempt to establish available source of data concerning the prevalence as well as severity of periodontal disease Egypt, in particular North Sinai governorate.

In the present study, a total sample of 1908 subjects (978 males & 930 females); was screened for prevalence of GR and showed overall of 41.6%; males showed statistically significantly higher prevalence of GR than females(63.4% in males &36.6% in females). Similar results were reported in previous studies[25,26]. An Italian study reported an overall GR prevalence of 39%[27], which is not far away from findings of the present study. On contrary, an Indian study[28] reported a lesser prevalence of GR with a value of 18%, which is differed greatly than finding of the present study as well as other studies[25]. This contradiction can be attributed to inclusion criteria differences, as they include very young age group (10–15 years) of subjects in their study, but the present study and other studies[25,26] included sample with a wide range of the age as representative of the living population and not restricted the included sample to specific age group.

In the present study, GR correlated with the age; more GR was found among the older age groups. Hence, younger age group (20–35 years) showed 33.1% GR; while older age group (60+ years) had GR of 56.9%; other studies reported GR frequency of 100% for older age group[29,30]. This relationship between occurrence of GR and age may be explained on the basis that the longer exposure period to the agents that cause GR is cumulative; associated with intrinsic changes involving gingival tissue either local and systemic risk factors. The postulation of Loe et al[20] that destructive process of periodontal tissues progresses steadily over time, lend support to the findings obtained here regarding the correlation between GR severity and aging. GR occurrence among young patients, included in the present study showed localized distribution; it seems likely that this can be linked to effect of isolated etiologic factors that participate to its restriction to affected areas. On the other hand, a more generalized distribution, as observed among older subjects, might indicate clearly the effect of long term associated cumulative effect of several factors, such as previous periodontal disease as well as trauma associated with tooth brushing technique applied.

The results of the present study, showed high frequency of GR among males (63.4%) compared to females (36.6%), this finding was comparable to other studies[17,22]. Maxillary posterior sites showed highest prevalence of GR compared to other teeth; a finding of the present study confirming that of previous studies[31,32]. However, GR was more in mandibular anterior sites in other studies[20] which contradict the findings of the present study. It is well documented that, GR may be found in teeth that are prominently positioned that is, the alveolar bone is thin or absent, and the gingival tissue is thin in these areas. Areas with deficient keratinized mucosa have been demonstrated to be more susceptible to GR, especially due to the smaller amount of connective tissue available in the area. In the present study, Miller's type I GR was more commonly seen, which was comparable with other studies[28,30]. Results

showed that, the most affected sites were the upper posterior and lower anterior teeth, these results were consistent with another study[33] reported that GR was more common in mandibular anterior teeth; however others reported that GR affected mainly area of maxillary first molars[31,32].

The role of dental plaque accumulation and gingival inflammation in development of GR has been analyzed in various epidemiological studies, in which gingival inflammation was the most frequent precipitating etiological factor of GR[7,34]. Thus, a study[18] recorded positive association between high levels of dental plaque accumulation with occurrence of GR, a finding that was not confirmed by similar study[35]. The obtained results of the present study were in accordance with this finding, as teeth surface deposits including dental plaque were markedly noted among majority of included subjects (50.63%); males showed a ratio of 61.55% while females showed a ratio of 39.14%, which declare that females were caring about their mouth cleaning than males.

It should be emphasized that, searching for a possible role played by risk indicators either generalized or localized, for incidence and severity of GR among the included sample in this study showed an interesting findings. Thus, results showed that Smoking (56.74%), Hypertension (23.27%), using Anticoagulant drugs (11.53%) and Diabetes mellitus (14.78%). These systemic conditions were acknowledged as risk indicators in the natural history of periodontal disease development with formation of its manifestations as gingival recession. It seems likely that GR recorded in the present study may have, in somehow, a link to these systemic disorders. However, this postulation needs further clarification. Additionally, known localized risk factors were assessed here; it was found that mouth breathing showed a ratio of 14.62%, clenching found in 11.11% of total sample and bad oral habits recorded among 5.19 %; with no differences between males and females. It was evident from obtained results

that, only 19.92% of the whole included sample was on regular tooth brushing, 45.02% were used tooth brushing on frequent basis, while 35.06% were not using tooth brush at all. This can be considered in relation to the recorded high levels of dental plaque and calculus deposits among the included sample of the present study (50.63 %). Thus, they were lacking the effective cleansing mechanisms of their mouth.

It would be of value to mentioned that, findings of present study can be considered as a preliminary basis toward establishing an oral epidemiological Egyptian studies. This line of investigation is a vital step toward better understanding of prevalence, distribution and severity of various forms of periodontal disease in Egypt. Hence, effective preventive as well as therapeutic measures and financial fund can be planned and undertaken toward better improvement, maintenance of health for Egyptian population.

CONCLUSION

The prevalence of GR is more in males than females. It was found to be more common in maxillary posterior area than other sites. Gender, age and oral hygiene are the major etiologic factors that affect GR incidence. Systemic conditions specially smoking are major risk factors in GR prevalence.

REFERENCES

1. Pradeep K, Rajababu P, Satyanarayana D, Sagar V: Gingival recession: review and strategies in treatment of recession. Case Rep Dent. 2012:1-6.

2. Susin C, Haas A, Opperman R, Haugejorden O, Albandar J: Gingival recession: Epidemiology and Risk Indicators in a Representative Urban Brazilian Population. J Periodontol, 2004; 75:1377–86.

3. Greenwell H, Fiorellini J, Giannobile W, Offenbacher S, Salkin L, Townsend C, et al: Oral reconstructive and corrective considerations in periodontal therapy. J Periodontol. 2005; 76:1588-600.

4. Dilsiz A, Aydin T: Gingival recession associated with orthodontic treatment and root coverage. J Clin Exp Dent. 2010; 2:30-3.

5. Pires I, Cota L, Oliveira A, Costa J, Costa F: Association between periodontal condition and use of tongue piercing: a case-control study. J Clin Perio. 2010; 37:712-8.

6. Sarfati A, Bourgeois D, Katsahian S, Mora F, Bouchard P: Risk assessment for buccal gingival recession defects in an adult population. J Periodontol. 2010; 81:1419–25.

7. Roberts-Harry E, Clerehugh V: Sub-gingival calculus: where are we now? A comparative review. J Dent. 2000; 28:93–102.

8. Murray J: Gingival recession in tooth types in high fluoride and low fluoride areas. J Perio Res 2006; 8:243–51.

9. World Health Organization Regional Office for the Eastern Mediterranean. Egypt: Events. http://www.emro.who.int/egy/egypt-events/results-of-epidemiological-study-on-oral-health-status-released.html. Accessed January 21, 2021.

10. Jain S, Kaur H, Aggarwal R: Classification systems of gingival recession: An update. Indian J Dent Sci. 2017; 9:52-9.

11. Sullivan H, Atkins J: Free autogenous gingival grafts. I. Principles of successful grafting. Periodontics. 1968; 6:121-9.

12. Miller PD Jr: A classification of marginal tissue recession. Int J Periodontics Restorative Dent. 1985; 5:8-13.

13. Cairo F, Nieri M, Cincinelli S, Mervelt J, Pagliaro U: The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. J Clin Periodontol. 2011; 38:661-6.

14. Kumar A, Masamatti S: A new classification system for gingival and palatal recession. J Indian Soc Periodontol. 2013; 17:175-81.

15. Guttiganur N, Aspalli S, Sanikop M, Desai A, Gaddale R, Devanoorkar A: Classification systems for gingival recession and suggestion of a new classification system. Indian J Dent Res. 2018; 29:233-7.

16. Banting D, Ellen R, Fillery E: Prevalence of root surface caries among institutionalized older patients. Community Dent Oral Epidemiol. 1980; 8:84–8.

17. Albandar J, Kingman A: Gingival recession, gingival bleeding, and dental calculus in adults 30 years of age and older in the United states, 1988–1994. J Periodontol. 1999; 70:30–43.

18. Toker H, Ozdemir H: Gingival recession: epidemiology and risk indicators in a university dental hospital in Turkey. Int J Dent Hyg. 2009; 7:115-20.

19. Rios F, Costa R, Moura M, Jardim J, Maltz M, Haas A: Estimates and multivariable risk assessment of gingival recession in the population of adults from Porto Alegre, Brazil. J Clin Period 2014; 41:1098-107.

20. Löe H, Anerud A, Boysen H: The natural history of periodontal disease in man: prevalence, severity, and extent of gingival recession. J Periodontol. 1992; 63:489-95.

21. Mumghamba E, Honkala S, Honkala E, Manji K: Gingival recession, oral hygiene and associated factors among Tanzanian women. East Afr Med J. 2009; 86:125-32.

22. Vehkalahti M: Occurrence of gingival recession in adults. J Periodontol. 1989; 60:599-603.

23. State of information Service, Egypt; Archives from the original, 25/11, 2018.

24. Ressing M, Blettner M, Klug S: Data Analysis of Epidemiological Studies. Deutsches Arzereblatt International. 2010; 107:187-92.

25. Van Palenstein Helderman W, Lembariti B, van der Weijden G, van't Hof M: Gingival recession and its association with calculus in subjects deprived of prophylactic dental care. J Clin Periodontol. 1998; 25:106-11.

26. Erwin J, Bucher E: Prevalence of tooth root exposure and abrasion among dental patients. Dent Items Interest 1944; 66:760-7.

27. Vignoletti F, Di Martino M, Clementini M, Di Domenico G, de Sanctis M: Prevalence and risk indicators of gingival recessions in an Italian school of dentistry and dental hygiene: a cross-sectional study. Clin Oral Investig. 2020; 24:991-1000.

28. Mathur A, Jain M, Jain K, Samar M, Goutham B, Swamy P, et al: Gingival recession in school kids aged 10-15 years in Udaipur, India. J Indian Soc Periodontol 2009; 13:16-20.

29. Almeida A, Madeira L, Freitas K, Greghi S, Pegoraro L: Cross-sectional evaluation of the presence of gingival recession in individuals with cleft lip and palate. J Periodontol 2007; 78:29-36.

30. Gorman W: Prevalence and etiology of gingival recession. J Periodontol 1967; 38:316-22.

31. Gillette W, Van House R: Ill effects of improper oral hygiene procedure. J Am Dent Assoc 1980; 101:476-80.

32. Chrysanthakopoulos N: Gingival recession: Prevalence and risk indicators among young greek adults. J Clin Exp Dent 2014; 6:243-9.

33. Akpata E, Jackson D: The prevalence and distribution of gingivitis and gingival recession in children and young adults in Lagos, Nigeria. J Periodontol 1979; 50:79-83.

34. Mahajan A: Mahajan's modification of Miller's classification for gingival recession. Dent. Hypotheses 2010; 1:45-50.

35. Slutzkey S, Levin L: Gingival recession in young adults: occurrence, severity and relationship to past orthodontic treatment and oral piercing. Am J Orthot Dent Orthoped. 2008; 134:652-6.