



The prevalence and relationship of root caries depth and gingival recession among different Iraqi groups

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Abstract

Background: Root caries is considered as a major dental problem in persons with advanced age. It most often occurs at or close to the cemento-enamel junction. A dominating dental problem in the patients of periodontal diseases is the root caries. Specifically, gingival recession often results in root surfaces exposure and increase risk for root caries. The aim from this study is to determine the prevalence of the gingival recession and the root caries depth, and to find the relationship between root caries depth and gingival recession at different age stages for both genders using scores for both root caries depth and gingival recession.

Materials and Methods: The study sample consisted of (144) patients was selected, aged (21-65) years old, from patients attending the Dental Clinics of Al-Mustansiriyah University, Alrafidain College and Althawra Dental Centers. Questionnaire case sheet forms were filled by dentist. For each patient, clinical examination was performed using a periodontal probe to measure root caries depth and gingival recession.

Results: The prevalence of gingival recession and root caries was higher in male groups (1,3,5) in comparison with female groups (2,4,6) and increased with age in all teeth and surfaces. The study showed that females aged 21-35 years (group 2) had lower percentage of gingival recession (8% for teeth and 5.1% for surfaces) and root caries (6.9% for teeth and 5.3% for surfaces); while males aged 51-65 years (group 5) showed higher percentage of gingival recession (23.7% for teeth and 24.8% for surfaces) and root caries (30.6% for teeth and 25.3% for surfaces). Mandibular anterior teeth exhibited more gingival recession (22.1) than other teeth; while mandibular molar teeth exhibited more root caries (23.6%) than other teeth. The facial surfaces of maxillary and mandibular teeth were showed higher percentage of gingival recession (15.3% for maxillary, 17.2% for mandibular) and root caries (17.3% for maxillary, 20.5% for mandibular) in comparison with other surfaces. This study showed a significant difference between root caries depth scores (1,2,3), gingival recession scores (2,3) and also with the age; while there was non-significant difference between root caries depth scores (1,2,3) and gingival recession score (1).

Conclusion: There was a positive relationship between root caries depth and gingival recession with advance of age. This can be related to that, patients with advance of age have susceptibility to expose for longer time to risk factors due to periodontal

diseases that can lead to increased gingival recession and root caries. Gingival recession and root caries were found in males more than females.

Key words: Root caries depth, Gingival recession, Age, Periodontal probe.

Introduction

Gingival recession (GR) has been defined as a displacement of gingival margin apically from the cemento-enamel junction (CEJ), leading to root-surface exposure, which may cause poor esthetics, dentine hypersensitivity, plaque retention, gingival bleeding, susceptibility for root caries (RC) and later to the tooth loss^(1,2). Recession may be localized to one tooth or a group of teeth, or it may be generalized throughout the dentition⁽³⁾.

Risk factors associated with high prevalence of (RC) among older patients^(4,5,6) include:

- Decrease salivary flow or xerostomia.
- Exposure of root surfaces due to periodontal diseases (PD).
- Poor oral hygiene.
- Frequency of carbohydrate intake.
- Malocclusion.
- Overdenture abutments and removable partial dentures.
- Low educational and socioeconomic levels.
- Autoimmune disorders: e.g. Sjögren's syndrome.
- Systemic diseases: e.g. Diabetes mellitus (DM) and Hypertension.
- Gender: males are affected more than females.
- Physical disability where patients have limited manual dexterity for cleaning of teeth.

Root caries was defined as soft, progressive lesion that is found anywhere on the root surface that has lost its connective tissue attachment and is exposed to the environment^(6,7). The (RC) occurs at or apical to the

(CEJ). Generally, (RC) lesions have been described as having a distinct outline and presenting with a discolored appearance in relation to the surrounding non-carious root. The rate of demineralization of root occurs at higher pH (6.4) and is much faster than that of enamel (5.5) because the root has less mineral content (55%) than that of enamel (99%)^(6,7).

Incidence of root decay is well known to be significantly increasing due to factors such as poor oral hygiene, xerostomia (resulted from different diseases and medications), diet high in carbohydrates, poor general health, low socioeconomic status^(4,8).

The reported prevalence of (GR) has varied widely according to the type of study performed and the age group studied as well as other factors. It has ranged from (0.5-100%) in various studies with different age groups and populations^(1,9,10). Albandar and Kingman⁽¹⁰⁾ conducted a study in the USA and reported an overall prevalence of (GR) was 58%. In Germany, Raetzke and Rockel⁽¹¹⁾ found (GR) in 76% and 87% of middle-aged adults. The (GR) is more common in older subjects but can be found in the young as well. It is found in the subjects with both good and poor oral hygiene alike⁽¹⁾.

The proportion of subjects with (GR) increases with age⁽¹⁰⁾. The acceptable and scientific explanation for this result is the patients with advancing the age, the oral hygiene is decrease which leads to increase plaque accumulation which results in passage of bacteria and their products

through the non-keratinized junctional epithelium; leading to a series of host responses that results in pocket formation and attachment loss⁽¹²⁾. In Mosul city in Iraq, Tariq et al.⁽¹³⁾ found that the prevalence of (GR) was increased with age from (35-100%) in males and (10-100%) in females. Badea⁽¹⁴⁾ reported that (GR) increased positively with progression of the age, and the percentage of males with (GR) was (63.03%) while in females the percentage was lower than that of males (50.72%). Moreover, Al-Ani and Abdul-Razzak⁽¹⁵⁾, found (GR) increases with age and more in males than females; also, they found that facial surfaces and molar teeth were more area of incidence of (GR).

The prevalence rate of (RC) in adults (43-63%) and its incidence has increased due to several possibilities of risk indicators for (RC) (e.g. age, gender, education, income, brushing, and sugar consumption)⁽¹⁶⁾. Consistently, Katz et al.⁽¹⁷⁾; Saunders and Meyerowitz⁽¹⁸⁾ showed that the prevalence of (RC) in adults has been progressively increased with age. Katz et al.⁽¹⁹⁾; Brunelle⁽²⁰⁾ found that the (RC) was more common in males than females, and the mandibular molars are the most susceptible teeth to (RC), followed by premolars, canines and incisors, which are rarely involved; this order is reversed in the maxilla. Brunelle⁽²⁰⁾ found that the facial surfaces of teeth are the most susceptible to (RC).

Gingival recession has been recognized as relevant predisposing factors in the onset of (RC), given the increased vulnerability of exposed root surfaces. The (RC) is considered as a serious problem affecting the long-term prognosis of both treated and untreated periodontally involved teeth^(21,22). Epidemiologic as well as large clinical trials of Bignozzi et al.⁽²²⁾; Steele et al.⁽²³⁾ agreed that presence of

(GR) is associated with a higher incidence of (RC).

Materials and methods

This study was carried out on patients attending the dental clinics of Al-Mustansiriyah University, Alrafidain College and Althawra Dental Centers. Systemic diseases (e.g. DM) were excluded from study because these patients take drugs that can lead to decrease saliva secretion, which leads to increase rate of (RC) or severity of (PD)⁽²⁴⁾.

Examination of the patients started from October 2014 to May 2015. More than 165 patients were examined and only 144 patients were included in this study, which have at least 20 natural teeth present (since large number of missing teeth might interfere with the results of this study) and the third molars were excluded^(25,26), and the teeth included in the study had at least one surface with (GR) and (RC). The included patients were divided into 6 groups as shown in Table (1).

The questionnaire case sheet forms were filled by the researcher, which included name, age, gender, medical condition and use of medication and if patient use preventive measures (tooth brush, mouth wash and dental floss or picks).

Intraoral examination was carried out using plane mouth mirror, and Williams's periodontal probes. All patients were examined in a dental chair to determine (GR), root caries depth (RCD) for (facial, mesial, distal, lingual and palatal) surfaces of each tooth^(15,25,27).

Gingival recession was recorded whenever there was more than 1mm of root surface exposed and linear measurements were obtained from the (CEJ) up to the gingival margin in affected teeth, in order to evaluate the vertical (apicocoronal) width of the

(GR) ^(25,26,27). Three categories were established according to the apicocoronal dimension of the root surface exposed; this was done according to criteria suggested by Miller in 1985:

Grade 1	(GR) < 3mm
Grade 2	(GR) between 3-4mm
Grade 3	(GR) > 4mm

The most commonly used clinical signs to describe (RC) utilized visual (color, contour, surface cavitation) and tactile (surface texture) specifications ⁽²⁹⁾. Facetti and Kolker ⁽³⁰⁾ were used periodontal probe to measure (RC) on extracted teeth to evaluate the correlation between (RC) visual/tactile characteristics and the histological severity of cementum, dentine and pulpal involvement, so we used periodontal probe to measure (RCD) clinically, where inserted on affected surface to the deepest point and measurement was recorded as shown in Figure (1). Three categories were suggested in this study as following:

Grade 1	(RCD) < 1mm
Grade 2	(RCD) between 1-2mm
Grade 3	(RCD) > 2mm

Radiographs were not taken for any of the participants because of practical limitations.

Both descriptive and inferential analysis were used in order to analyze and assess the results of the study:

- Descriptive statistics: Mean, Percentages for both (RCD) and (GR).
- Inferential statistics: Chi-square test used for comparison among groups for different scores for both (RCD) and (GR), and Pearson's correlation coefficient (R) used for testing the correlation among (RCD), (GR), and age within groups for different scores.

Results

The sample was consisted of (144) patients, the ages of them ranged between (21-65 years) with a mean age of (41 year), 50% of patients were males and 50% of patients were females (male to female ratio in this study was 1:1). Furthermore, patients were divided into three age groups for each genders (21-35 male), (21-35 female), (36-50 male) (36-50 female), (51-65 male), and (51-65 female) years as shown in Table (1).

The distribution of the (GR) was increased in male groups (1,3,5) (10.8%, 20.8%, 24.8% for surfaces respectively and 13.2%, 18.7%, 23.7% for teeth respectively) in comparison with female groups (2,4,6) (5.1%, 15.4%, 23.2% for surfaces respectively and 8%, 16.5%, 20% for teeth respectively) as shown in Tables (2,4), also, the (GR) was increased with advance of age in all surfaces and teeth as shown in Tables (2,4).

The distribution of the (RC) was increased in male groups (1,3,5) (10.4%, 20.9%, 25.3% for surfaces respectively and 11.2%, 16.1%, 30.6% for teeth respectively) in comparison with female groups (2,4,6) (5.3%, 15.1%, 23%) for surfaces respectively and 6.9%, 14.2%, 21.1% for teeth respectively) as shown in Tables (3,5), also, the (RC) was increased with advance of age in all surfaces and teeth as shown in Tables (3,5).

The study showed female aged 21-35 years (group 2) lower percentage of (GR) (5.1% for surfaces and 8% for teeth) while male aged 51-65 years (group 5) showed higher percentage of (GR) (24.8% for surfaces and 23.7% for teeth) as shown in Tables (2,4).

The study showed female aged 21-35 years (group 2) lower percentage of (RC) (5.3% for surfaces and 6.9% for teeth) while male aged 51-65 years (group 5) showed higher percentage of (RC) (25.3% for surfaces and 30.6% for teeth) as shown in Tables (3,5).

The (GR) was higher in mandibular surfaces and teeth in all groups (51.4%, 51.9%, 53.7%, 54.4%, 56.1%, 53.9% for surfaces subsequently and 52.7%, 52.6%, 53.2%, 51.7%, 51.2%, 54.5% for teeth subsequently) than maxillary surfaces and teeth (48.6%, 48.1%, 46.3%, 45.6%, 43.9%, 46.1% for surfaces subsequently and 47.3%, 47.4%, 46.3%, 48.3%, 48.8%, 45.5% for teeth subsequently) as shown in Tables (2,4).

The (RC) was higher in mandibular surfaces and teeth in all groups (59.7%, 56.6%, 52.3%, 56.2%, 53%, 54.1% for surfaces subsequently and 57.6%, 53.8%, 52.5%, 52.8%, 54.3%, 54.4% for teeth subsequently) than maxillary surfaces and teeth (40%, 43.4%, 47.7%, 43.8%, 47%, 45.9% for surfaces subsequently and 42.4%, 46.2%, 47.5%, 47.2%, 45.7%, 45.6% for teeth subsequently) as shown in Tables (3,5).

The facial surfaces of maxillary and mandibular teeth had higher percentages of (GR) (15.3% and 17.2%) followed by (mesial, distal, lingual/palatal) surfaces (12.3%, 9.6%, 8.7% for maxillary teeth and 13.8%, 12.7%, 10.3% for mandibular teeth subsequently) as shown in Tables (2).

The facial surfaces of maxillary and mandibular teeth had higher percentages of (RC) (17.3% and 20.5%) followed by (mesial, distal, lingual/palatal) surfaces (12.1%, 11.9%, 4.2% for maxillary teeth and 14.3%, 14%, 5.6% for mandibular teeth subsequently) as shown in Tables (3).

Maxillary molars and mandibular anterior teeth had higher percentages of (GR) than other teeth in all study groups (21.3%, 19.3%, 18.6%, 19.5%, 20.1%, 21% subsequently for maxillary molars and 22.3%, 22.8%, 22.5%, 21.2%, 21%, 23.4% subsequently for mandibular anterior teeth), but the mandibular anterior

teeth had higher percentage of (GR) (22.1%) than maxillary molars (20%) as shown in Table (4). While maxillary anterior and mandibular molars teeth had higher percentages of (RC) in all study groups (18.8%, 19.2%, 21.3%, 20.4%, 23.3%, 20.6% subsequently for maxillary anterior teeth and 23.5%, 30.8%, 23.8%, 21.3%, 24.1%, 21.9% subsequently for mandibular molars), but the mandibular molars had higher percentages of (RC) (23.6%) than maxillary anterior teeth (21.2%) as shown in Table (5).

Chi-square test was used for comparison of all (GR) scores (1,2,3) among groups; the results showed that there was high significant difference at $P\text{-value} \leq 0.01$ among groups as shown in Table (6). The (GR) score (1) appeared higher percentage in aged groups (21-35; 36-50 years) for both genders (55.3%, 71.9%, 40.1%, 36.9%) subsequently. While (GR) score (3) appeared higher percentage in aged groups (51-65 years) for both genders (47.6%, 44.8%).

Also, chi-square test was used for comparison of all (RCD) scores (1,2,3) among groups; the results showed that there was significant difference at $P\text{-value} \leq 0.01$ among groups as shown in Table (7). The (RCD) score (1) appeared higher percentage in aged groups (21-35; 36-50 years) for both gender (47.1%, 46.2%, 40.2%, 40.7%) subsequently. While (RCD) score (2) appeared higher percentage in aged groups (51-65 years) for both gender (35.8%, 35%).

Pearson's correlation coefficient (R) was used to show the relationship between (RCD) scores with (GR) scores and with age. This study shows there was correlations between (RCD) scores with (GR) scores and age as shown in Table (8) and Figure (2).

The study showed non-significant difference between (RCD) score (1) and (GR) score (1). While, there was

high significant difference between (RCD) score (1) and (GR) scores (2,3). Whereas, there was significant difference between (RCD) score (1) and age as shown in Table (8) and Figure (2).

Also, there was non-significant difference between (RCD) scores (2,3) and (GR) score (1). While, there was significant difference between (RCD) scores (2,3) and (GR) score (2). Whereas, there was high significant difference between (RCD) scores (2,3) and (GR) scores (3). In addition, there was significant difference between (RCD) scores (2,3) and age as shown in Table (8) and Figure (2).

Discussion

Root surface caries has been and continued to be a major problem for dentate elderly adults. As such management of (RC) in older population is predicted to be one of the greatest challenges facing dental team in the future^(12,31).

This study was focused on determining the prevalence of (GR) and (RCD), and finding the relationship between (RCD) and (GR) at different aged stages for both gender using scores for both (RCD) and (GR) among dentally attendance peoples lived in Baghdad city.

The prevalence of (GR) obtained in this study for male groups (1,3,5) was higher than that of female groups (2,4,6) subsequently. This could be due to more number of males having poor oral hygiene (more plaque accumulation and gingival inflammation), less positive attitudes towards oral health and dental visit behaviors seen among males^(32,33). This result agreed with Badea⁽¹⁴⁾; Toker and Ozdemir⁽³⁴⁾; Chrysanthakopoulos⁽³⁵⁾ while Beck et al.⁽³⁶⁾ disagreed with the study in which the results revealed that the

prevalence of (GR) is similar in males and females. Whereas Kozłowska et al.⁽³⁷⁾ observed that (GR) of females was higher than males.

The prevalence of (RC) in male groups (1,3,5) was higher than that of female groups (2,4,6). This result was agreed with Al-Sayagh⁽³¹⁾; Qasim⁽³⁸⁾. This result may possibly because they kept a higher number of their teeth for longer in life compared to women^(19,39), in addition may be due to the fact that females take care of their teeth better than males⁽³⁸⁾.

The current study revealed that the prevalence of (GR) tends to be increased with age. This confirmed the findings of other studies of Al-Ani and Abdul-Razzak⁽¹⁵⁾; Guimaraes and Aguiar⁽⁴⁰⁾; Rao et al.⁽¹²⁾. This was due to the cumulative effect of age, (PD) and the longer period of exposure to the risk factors, which cause (GR)^(26,41).

Moreover, the prevalence of (RC) tends to be increased with age. This result is in an accordance with the findings of other studies of Katz et al.⁽¹⁷⁾; Imazato et al.⁽⁴²⁾; Qasim⁽³⁸⁾. This may be attributed to the fact that the older subjects have been exposed longer time to risk factors, thus their tendency for (RC) occurrence will be greater⁽³⁸⁾. Also, in older patients the (dietary habits, microbial factors, and salivary factors) were analyzed together lead to increase of (RC) with advance of age⁽⁴³⁾.

According to our results, male aged 21-35 years (group 5) had higher percentage of (GR) and (RC) while female aged 21-35 years (group 2) showed lower percentage of (GR) and (RC). This can be related to age effect; (group 5) has susceptibility to expose for longer time to risk factors that can lead to increase (GR). In addition, the gender may be considered as another effect; (group 5) has poorer oral hygiene than other groups that can lead

to increase of (GR) ^(12,33,38). While in (group 2), the results were reversed to (group 5).

The (GR) and (RC) appeared higher in mandibular dentition than maxillary in all groups. This may be probably related to the characteristics of keratinized mucosa, which is wider and thicker in maxilla than in the mandible ⁽⁴⁴⁾. This was in agreement with Vehkalathi ⁽⁴⁵⁾; Anarthe et al. ⁽²⁷⁾; Marini et al. ⁽²⁵⁾, while disagrees with Gorman ⁽⁹⁾ which observed a similar prevalence of (GR) on the maxilla and mandible.

The buccal or labial surfaces of maxillary and mandibular teeth revealed higher percentages of (GR) and (RC) from other surfaces (lingual or palatal, mesial, distal) in all groups. This was in agreement with Al-Ani and Abdul-Razzak ⁽¹⁵⁾; Albandar and Kingman ⁽¹⁰⁾; Lapa and Veiga ⁽⁴⁶⁾, and this may be related to the improper tooth brushing habits which considered as an etiological factor of (GR) ^(15,41).

Mandibular anterior teeth showed higher percentage of (GR) followed by maxillary molars than other teeth. The (GR) on the mandibular anterior teeth has been primarily associated to poor oral hygiene demonstrated by the presence of dental plaque and calculus ^(10,34). Calculus provides the opportunity for accumulation of dental plaque and consequent periodontal destruction as indicated by the (GR) itself ⁽⁴⁷⁾. In addition, the presence of supra-gingival calculus had the most significant association with localized and generalized (GR) ^(34, 47,48). This result agreed with Albandar and Kingman ⁽¹⁰⁾; Toker and Ozdemir ⁽³⁴⁾, and disagreed with Khosya and Devaraj ⁽⁴⁹⁾, who showed the most frequent affected teeth with (GR) were the maxillary 1st and 2nd molars followed by the mandibular incisors, while Al-Ani and Abdul-Razzak ⁽¹⁵⁾; Muller et al. ⁽⁵⁰⁾ who found that molar

teeth appeared with higher percentages of (GR). These differences could be attributed to several factors such as the heterogeneity samples, the difference in attitude of the samples to the value of oral hygiene and the need for a regular dental follow-up, the different criteria used by several examiners (clinical examination-questionnaire) in order to collect data, and the origin of the sample collected (dental hospital, private practice, etc.).

While mandibular molars showed higher percentage of (RC) in all study groups. This result agreed with Katz et al. ⁽¹⁹⁾; Imazato et al. ⁽⁴²⁾; Al-Ani and Abdul-Razzak ⁽¹⁵⁾, while Watanabe ⁽⁵¹⁾ confirmed that premolars and molars are the most susceptible to (RC), and disagree with Hellyer et al. ⁽⁵²⁾ who reported that maxillary canines and mandibular premolars were the most commonly affected by (RC). The proper explanation for this result could be traumatic tooth brushing, outcome of a poor oral hygiene (demonstrated by the presence of dental plaque and calculus) in this area.

The results showed that there was high significant difference at P-value ≤ 0.01 when compared all (GR) scores among groups. The (GR) score (1) demonstrated higher percentage in groups (1,2,3,4) followed by scores (2,3) respectively. While (GR) score (3) appeared with higher percentage in groups (5,6) followed by scores (2,1) respectively. This may be related to that groups (1,2,3,4) have good oral hygiene in comparison with groups (5,6); so the groups (1,2,3,4) have higher probability for brushing away gingival tissue to have 1mm or more exposed cementum on surfaces of one or more teeth ⁽¹⁵⁾. This result agreed with Al-Ani and Abdul-Razzak ⁽¹⁵⁾; Marini et al. ⁽²⁵⁾; Humagain and Kafle ⁽²⁶⁾ in spite of differences in age groups of that studies.

Also, the results showed that there was a significant difference at P-value ≤ 0.01 when compared all (RCD) scores among groups. The (RCD) score (1) showed higher percentage in groups (1,2,3,4) followed by scores (2,3) subsequently. While (RCD) score (2) appeared with higher percentage in groups (5,6) followed by scores (3,1) subsequently. This may be related to that groups (1,2,3,4) have good oral hygiene in comparison with groups (5,6); so the groups (1,2,3,4) have higher rate for brushing teeth and using of fluoride sources, so the salivary minerals may be enhanced at the plaque-mineral interface due to regular increases in the fluoride ion activity which occurs during and after tooth brushing⁽⁵³⁾; so that the depth of (RC) is less than 1mm and can be easily remineralized and converted to arrested or inactive caries in these groups. While with advance of age and poor oral hygiene in groups (5,6), the depth of (RC) increased irreversibly and progressively⁽³⁸⁾ and has become more than more than 1mm.

According to our results, there were strong positive relationship of (RCD) scores with (GR) scores and age. There was ample evidence showing that periodontal disease increases with age due to its cumulative nature. Thus, leads to increase (GR), which shall predispose the person to suffer from (RC)^(18,54). In addition, the occurrence of (GR) increase the probability of exposure of root surface to oral environment, besides an increase in the accumulation of dental plaque, which may lead to higher susceptibility of (RC)⁽²⁷⁾.

The current study showed non-significant difference between all (RCD) scores (1,2,3) with (GR) score (1). While, there was high significant difference between (RCD) score (1) with (GR) score (2). Whereas, there was significant difference between

(RCD) scores (2,3) and (GR) score (2). In addition, there was high significant difference between all (RCD) scores (1,2,3) with (GR) score (3). This may be related to that increasing of (GR) score appeared positive effect of occurring and progression (RCD). Moreover, the opportunity of cleaning of root surface and remineralize of (RC) and become inactive or arrested is higher if (GR) is more⁽⁵³⁾.

Also, there was significant difference between all (RCD) scores (1,2,3) with age. This may be attributed to the fact that the older patients have been exposed longer time to risk factors, thus their tendency for (RC) occurring will be greater⁽³⁸⁾.

This study concluded that these alterations could increase among population so it is important to conduct oral dental health care. Programs including dental health education and periodontal health care in addition to fluoride preventive measures to control this increase.

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Table (1): Distribution of the patients into six groups.

Group 1	24 males	21-35 years
Group 2	24 females	21-35 years
Group 3	24 males	36-50 years
Group 4	24 females	36-50 years
Group 5	24 males	51-65 years
Group 6	24 females	51-65 years



Figure (1): Measurement of (RCD) using periodontal probe.

Table (2): Percentages and numbers of surfaces with (GR) for each groups.

Groups	Gingival recession (GR) in maxillary surfaces										Gingival recession (GR) in mandibular surfaces										Total maxillary & mandibular surfaces	
	F		M		D		P		Total maxillary surfaces		F		M		D		L		Total mandibular surfaces			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Group 1 M (21-35)	64	19.6%	41	12.5%	32	9.8%	22	6.7%	159	48.6%	66	20.2%	46	14.1%	34	10.4%	22	6.7%	168	51.4%	327	10.8%
Group 2 F (21-35)	24	15.6%	21	13.6%	19	12.3%	10	6.5%	74	48.1%	26	16.9%	23	14.9%	21	13.6%	10	6.5%	80	51.9%	154	5.1%
Group 3 M (36-50)	96	15.2%	76	12.2%	70	11.1%	50	7.9%	292	46.3%	104	16.5%	88	14.0%	86	13.7%	60	9.5%	338	53.7%	630	20.8%
Group 4 F (36-50)	68	14.6%	51	11.0%	49	10.5%	44	9.5%	212	45.6%	86	18.5%	59	12.7%	55	11.8%	53	11.4%	253	54.4%	465	15.4%
Group 5 M (51-65)	112	14.9%	96	12.8%	40	5.3%	82	10.9%	330	43.9%	124	16.5%	106	14.1%	100	13.3%	91	12.1%	421	56.1%	751	24.8%
Group 6 F (51-65)	100	14.3%	86	12.3%	81	11.6%	56	8.0%	323	46.1%	114	16.3%	97	13.8%	90	12.8%	77	11.0%	378	53.9%	701	23.2%
Total	464	15.3%	371	12.3%	291	9.6%	264	8.7%	1390	45.9%	520	17.2%	419	13.8%	386	12.7%	313	10.3%	1638	54.1%	3028	100%

Table (3): Percentages and numbers of surfaces with (RC) for each groups.

Groups	Root caries (RC) in maxillary surfaces										Root caries (RC) in mandibular surfaces										Total maxillary & mandibular surfaces	
	F		M		D		P		Total maxillary surfaces		F		M		D		L		Total mandibular surfaces			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Group 1 M (21-35)	25	16.8%	14	9.4%	13	8.7%	8	5.4%	60	40.0%	35	23.5%	24	16.1%	22	14.8%	8	5.4%	89	59.7%	149	10.4%
Group 2 F (21-35)	14	18.4%	9	11.8%	8	10.5%	2	5.3%	33	43.4%	16	21.1%	11	14.5%	12	15.8%	4	2.6%	43	56.6%	76	5.3%
Group 3 M (36-50)	52	17.3%	39	13%	40	13.3%	12	5.3%	143	47.7%	58	19.3%	43	14.3%	40	13.3%	16	4.0%	157	52.3%	300	20.9%
Group 4 F (36-50)	32	14.7%	28	12.9%	25	11.5%	10	5.5%	95	43.8%	48	22.1%	32	14.7%	30	13.8%	12	4.6%	122	56.2%	217	15.1%
Group 5 M (51-65)	68	18.7%	44	12.1%	44	12.1%	15	6.0%	171	47.0%	72	19.8%	49	13.5%	50	13.7%	22	4.1%	193	53.0%	364	25.3%
Group 6 F (51-65)	58	17.5%	40	12.1%	41	12.4%	13	5.7%	152	45.9%	66	19.9%	47	14.2%	47	14.2%	19	3.9%	179	54.1%	331	23.0%
Total	249	17.3%	174	12.1%	171	11.9%	60	4.2%	654	45.5%	295	20.5%	206	14.3%	201	14.0%	81	5.6%	783	54.5%	1437	100%

Table (4): Percentages and numbers of teeth with (GR) for each groups.

Groups	Gingival recession (GR) in maxillary teeth								Gingival recession (GR) in mandibular teeth								Total maxillary & mandibular teeth	
	Anterior		Premolars		Molars		Total maxillary teeth		Anterior		Premolars		Molars		Total mandibular teeth			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Group 1 M (21-35)	26	13.8%	23	12.2%	40	21.3%	89	47.3%	42	22.3%	30	16.0%	27	14.4%	99	52.7%	188	13.2%
Group 2 F (21-35)	20	17.5%	12	10.5%	22	19.3%	54	47.4%	26	22.8%	20	17.5%	14	12.3%	60	52.6%	114	8.0%
Group 3 M (36-50)	46	17.2%	29	10.9%	50	18.7%	125	46.3%	60	22.5%	48	18.0%	34	12.7%	142	53.2%	267	18.7%
Group 4 F (36-50)	36	15.3%	32	13.6%	46	19.5%	114	48.3%	50	21.2%	42	17.8%	30	12.7%	122	51.7%	236	16.5%
Group 5 M (51-65)	57	16.9%	40	11.8%	68	20.1%	165	48.8%	71	21.0%	56	16.6%	46	13.6%	173	51.2%	338	23.7%
Group 6 F (51-65)	39	13.6%	31	10.8%	60	21.0%	130	45.5%	67	23.4%	50	17.5%	39	13.6%	156	54.5%	286	20.0%
Total	224	15.7%	167	11.7%	286	20.0%	677	47.4%	316	22.1%	246	17.2%	190	13.3%	752	52.6%	1429	100%

Table (5): Percentages and numbers of teeth with (RC) for each groups.

Groups	Root caries (RC) in maxillary teeth								Root caries (RC) in mandibular teeth								Total maxillary & mandibular teeth	
	Anterior		Premolars		Molars		Total maxillary teeth		Anterior		Premolars		Molars		Total mandibular teeth			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Group 1 M (21-35)	16	18.8%	11	12.9%	9	10.6%	36	42.4%	13	15.3%	16	18.8%	20	23.5%	49	57.6%	85	11.2%
Group 2 F (21-35)	10	19.2%	7	13.5%	7	13.5%	24	46.2%	4	7.7%	8	15.4%	16	30.8%	28	53.8%	52	6.9%
Group 3 M (36-50)	26	21.3%	18	14.8%	14	11.5%	58	47.5%	17	13.9%	18	14.8%	29	23.8%	64	52.5%	122	16.1%
Group 4 F (36-50)	22	20.4%	16	14.8%	13	12.0%	51	47.2%	14	13.0%	20	18.5%	23	21.3%	57	52.8%	108	14.2%
Group 5 M (51-65)	54	23.3%	28	21.1%	24	10.3%	106	45.7%	32	13.8%	38	16.4%	56	24.1%	126	54.3%	232	30.6%
Group 6 F (51-65)	33	20.6%	22	13.8%	18	11.3%	73	45.6%	25	15.6%	27	16.9%	35	21.9%	87	54.4%	160	21.1%
Total	161	21.2%	102	13.4%	85	11.2%	348	45.8%	105	13.8%	127	16.7%	179	23.6%	411	54.2%	759	100%

Table (6): Percentages and numbers of scores of (GR) for each group and comparison among groups

Groups	Score 1	Score 2	Score 3	Chi-square	df	P-value	Sig.	
No	104	48	36					
G1	% within Groups	55.3%	25.5%	19.1%	166.495	10	0.000	**
No	82	21	11					
G2	% within Groups	71.9%	18.4%	9.6%				
No	107	84	76					
G3	% within Groups	40.1%	31.5%	28.5%				
No	87	78	71					
G4	% within Groups	36.9%	33.1%	30.1%				
No	72	105	161					
G5	% within Groups	21.3%	31.1%	47.6%				
No	66	92	128					
G6	% within Groups	23.1%	32.2%	44.8%				

P ≥ 0.05 Non-Significant (NS) P < 0.05 Significant (S)* P < 0.01 High Significant (HS)**

Table (7): Percentages and numbers of scores of (RCD) for each group and comparison among groups

Groups	Score 1	Score 2	Score 3	Chi-square	df	P-value	Sig.	
No	40	26	19					
G1	% within Groups	47.1%	30.6%	22.4%	17.786	10	0.05	*
No	24	18	10					
G2	% within Groups	46.2%	34.6%	19.2%				
No	49	41	32					
G3	% within Groups	40.2%	33.6%	26.2%				
No	44	36	28					
G4	% within Groups	40.7%	33.3%	25.9%				
No	67	83	82					
G5	% within Groups	28.9%	35.8%	35.3%				
No	51	56	53					
G6	% within Groups	31.9%	35.0%	33.1%				

P ≥ 0.05 Non-Significant (NS) P < 0.05 Significant (S)* P < 0.01 High Significant (HS)**

Table (8): Pearson's correlation coefficient of (RCD) with (GR) and ages among groups

(RCD) scores	(GR) scores	R	P-value	Sig.
S1	S1	-0.301	0.563	NS
	S2	0.947	0.004	**
	S3	0.943	0.005	**
	Age	0.818	0.047	*
S2	S1	-0.554	0.254	NS
	S2	0.879	0.021	*
	S3	0.979	0.001	**
	Age	0.873	0.023	*
S3	S1	-0.588	0.219	NS
	S2	0.858	0.029	*
	S3	0.977	0.001	**
	Age	0.870	0.024	*

P ≥ 0.05 Non-Significant (NS) P < 0.05 Significant (S)* P < 0.01 High Significant (HS)**

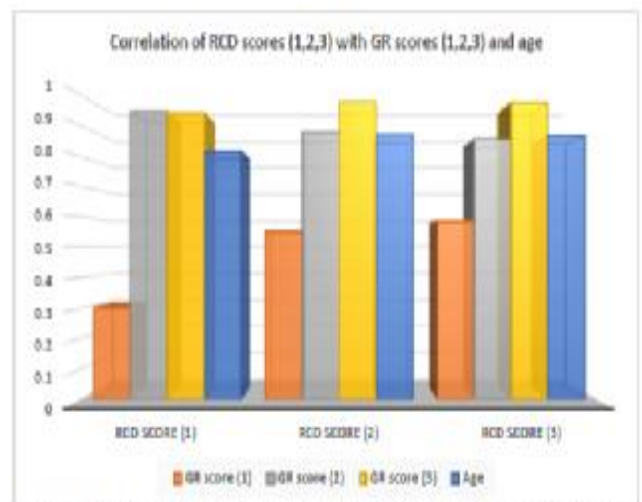


Figure (2): Bar chart graph for correlation of root caries depth scores (1,2,3) with gingival recession scores (1,2,3) and age.