



Prevalence of Periodontal Disease Among Undergraduate Students In AL-Qadisiyah Governorate, Iraq: A Cross-Sectional Study

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Keywords:

Al-Qadisiyah, periodontal disease, community periodontal index

Article Info.:

Article History:

Received: 15/6/2023

Received in revised form: 11/7/2023.

Accepted: 23/7/2023

Final Proofreading: 23/7/2023

Available Online: 1/6/2024

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Citation: Ghazi FM, Ahmed MA. Prevalence of Periodontal Disease Among Undergraduate Students In AL-Qadisiyah Governorate, Iraq: A Cross-Sectional Study. *Tikrit Journal for Dental Sciences* 2024; 12(1): 179-187.

<https://doi.org/10.25130/tjds.12.1.20>

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Abstract

Periodontal disease, which involves gingivitis and periodontitis, is a common oral infection that affects the tissues that surround and support the teeth. Previously there were no epidemiological studies to assess the prevalence of periodontal disease in Al-Qadisiyah governorate generally and Al-Qadisiyah colleges and institute specifically. Therefore, an epidemiological study to determine the prevalence of periodontal diseases is essentially needed. To assess the prevalence of periodontal disease for the final year undergraduate students at all colleges and institute in Al-Qadisiyah governorate, Iraq and investigate the effect of age, gender, socioeconomic status, marital status and lifestyle factors on periodontal health status. A cross-sectional study was performed in AL-Qadisiyah colleges and institute. A total of 800 last stages students were examined using the community periodontal index for treatment needs and chosen randomly through stratified random sampling. A questionnaire was used to record information about socioeconomic status, marital status, and lifestyle, and correlated with periodontal health status. The overall prevalence rate of periodontal disease for the final year of undergraduate students in Al-Qadisiyah colleges and institute was 84.6%. Bleeding code 1 and calculus code 2 recorded approximately similar percentages (31.5%) and (31.4) respectively and only 15.4 % of students had healthy periodontium, while the percentage of shallow and deep pockets recorded 18.4 % and 3.4% respectively. Community periodontal index for treatment needs varied non-significantly among marital status in which single students had healthier periodontium (16.5%) compared to married. The statistical analysis also showed that students with very good socioeconomic status and good lifestyle had the highest percentages of healthy periodontium (50%), (22.6%) respectively. The present study shows a higher prevalence rate of bleeding and calculus among final year of undergraduate students in Al-Qadisiyah colleges and institute with a lack of knowledge about periodontal health status. Hence, there are significant associations of age, gender, marital status, socioeconomic status, and lifestyle with periodontal health conditions, also the results indicated that the majority of the students need preventive programs to reduce PDs initiation or progression.

Introduction:

Oral health plays an important role in the general health of an individual. Teeth and the structures that supported them are important to oral health ⁽¹⁾. Periodontal disease (PDs), which involves gingivitis and periodontitis, is a common oral infection affecting tissues that surround and support the teeth ⁽²⁾. Gingivitis is the reversible form of PDs characterized by inflammation of the gingival tissues in response to a mature dental plaque biofilm. Gingivitis can progress to periodontitis in susceptible people, which cause permanent destruction of periodontal tissues ^(3,4), this condition if untreated leads to penetration of inflammation to the deeper tissues, altering the bone homeostasis and eventually leading to tooth loss ⁽⁵⁾.

Mixed bacterial colonization in the oral tissues is the main factor contributing to PDs ^(6,7). While other factors such as dental plaque, calculus, overhang restoration, developmental grooves, anatomical features such as short trunks, the cervical enamel projections, smoking, genetic factors, systematic factors and stress act as secondary etiological factors that accelerated the progression and development of PDs ^(8,9).

The Federation Dentaire Internationale and the joint working committee of the World Health Organization developed the community periodontal index of treatment needs (CPITN) ⁽¹⁰⁾. Several epidemiological studies in Iraq recorded a high prevalence of PDs among different age groups ⁽¹¹⁻¹⁶⁾.

In the current study an attempt was made to determine the prevalence of PDs and the effect of marital status, socioeconomic status and lifestyle on the periodontal health of a sample of students in Al-Qadisiyah colleges and institute.

Subjects and Methods

The protocol of an observational cross-sectional study was conducted at the Department of Periodontics, College of Dentistry, University of Baghdad to evaluate the prevalence of PDs among last stages undergraduate students at colleges and institute in Al-Qadisiyah governorate and was approved by the Ethical Committee of the College of Dentistry,

University of Baghdad. Permission to examine the students and approval for this study was obtained from the Presidency of the Universities of Al-Qadisiyah governorate and the concerned authorities in all colleges and institutes.

Due to the lack of previous data on the prevalence of periodontal disease in Al-Qadisiyah governorate, a pilot study was conducted on a small sample from six colleges to determine the prevalence of PDs to calculate the overall sample size needed, in which the prevalence of PDs 4 was 78%. Cochran's equation ($N = Z^2 P (1-P)/D^2$) was used to calculate the sample size (N) ⁽¹⁷⁾.

$$N = Z^2 P (1-P) / D^2$$

N= Minimum sample size

Z=Value of standard normal distribution (1.96 at p<0.05)

P= Expected proportion of population which has the attribute based on previous studies or pilot study (periodontal disease).

D=Absolute error or precision, has to be decided by researcher.

The overall sample size was 800, sample selection was based on a multistage systematic random sampling procedure ⁽¹⁸⁾ that included all departments of 34 colleges and institutes in Al-Qadisiyah (private and government).

Informed Consent was obtained from the students to participate in this study. After that the information about marital status, socioeconomic status and lifestyle was collected by using a questionnaire; followed by a clinical periodontal examination. The students in this study were examined using the CPITN index in accordance with WHO guidelines by using CPITN index ⁽¹⁹⁾. The scoring criteria were followed as suggested by Ainamo ⁽¹⁰⁾, a code from 0 to 4 was given as follows:

Code 0 = healthy tissue; code 1 = bleeding on probing; code 2 = Calculus or other plaque retentive factors such as ill-fitting crowns; code 3 = there is a pocket with a depth of 4–5 mm; code 4 = there is a pocket with a depth of more than 6 mm. Each student's mouth was divided into six sextants. The highest code was recorded for

each sextant. Once the highest code criteria was recorded there was unnecessary to examine the lower codes criteria. For students aged 20 years and above, the index teeth examined were 17, 16, 11, 26, 27, 36, 37, 31, 46 and 47, while for the students aged 19 years and below, the index teeth examined were 16, 11, 26, 36, 31 and 46. An index tooth was probed, use of WHO CPITN-E probe as a sensing instrument to detect 6, 5 and 4mm pockets depth, sub-gingival calculus and plaque retentive factors and bleeding response in that specific order. In this study, many factors were taken to determine their effect on periodontal health: -

Socioeconomic status (SES)

The students were classified according to income into four groups which are very good, good, acceptable and low groups⁽²⁰⁾.

Marital status

- A- Single
- B- Married.

Lifestyle

The eight-item health practice index (HPI), that was based on the eight habits of students, was used in the current study to identify whether the students had good lifestyle or not⁽²¹⁾, in which the students selected one of 2-6 multiple choices of each item (Table 1). The 'poor' health practices were coded as 0 and 'good' health practices were given a code 1. Each student was assigned a total code between (0-8) based on a number of "good" health practices and classified into one of the following three different categories⁽²²⁾: -

poor lifestyle (codes = 0–3), moderate lifestyle (codes = 4, 5) and good lifestyle (codes = 6– 8).

The Statistical Package for Social Science (version 23) was used to enter the data. For qualitative data, the Pearson chi-square test (χ^2) was used to determine significance. A P-value (P) of (≤ 0.05) was regarded as significant.

Results

1-Periodontal health status:

The results of the present study revealed that (15.4%) had healthy periodontium, but highest proportion of them had bleeding and calculus in approximately the same percentages (31.5%) and (31.4%) respectively, while pocket depth of 4-5 mm and 6 mm or more were presented in (18.4%) and (3.4%) of students respectively as shown in table (2).

2- Association between different variables and highest CPITN codes

Age: Table (3) shows the highest percentages of calculus (50%), 4-5 mm pocket depth and pocket 6 mm or more (25%) among students in older age group (30-39 years), while students in younger age group (18-19 years) had the highest percentage of the healthy periodontium (56.5%). There was a statistically significant association ($P \leq 0.05$).

Gender: Table (4) shows a higher percentage of calculus (33.2%), 4-5 mm pocket depth (33%) and pocket 6 mm or more (6.8%) among male students, while female students tend to have a higher percentage of healthy periodontium (21%). A statistically significant correlation ($P \leq 0.05$).

Socioeconomic status: Table (5) shows a higher percentage of healthy periodontium (50%) among very good socioeconomic status, while students of acceptable status recorded a higher percentage of pocket depth 4-5 mm (24.6%). The students with low socioeconomic status tend to have a lower percentage of healthy periodontium (8.7%) with higher percentages of calculus (43.4%) and pocket depth 6 mm or more (17.4%). The association between socioeconomic status and the highest CPITN codes was statistically significant.

Marital status: Table (6) show that married students tend for having higher percentages of calculus (38.1%), pocket depth 4-5 mm (19.6%) and pocket depth 6

mm or more (4.1%) and lower percentage of healthy periodontium (7.2%) when compared to single students. Single and married students had slightly similar bleeding percentages (31.6%) and (31%) respectively. These associations were statistically non-significant.

Lifestyle Index: Table (7) show higher percentages of the healthy periodontium (22.6%) and bleeding (38.6%) among students with a good lifestyle, while students with poor lifestyle had highest percentages of calculus (39.7%), 4–5mm pocket depth (32.8%), and 6 mm or more pocket depth (10.7%). The association was statistically significant ($P \leq 0.05$).

Discussion

In the current study code 1 (bleeding) was the most prevalent code then was followed by code 2 (calculus), code3 (4–5mm pocket depth), code0 (healthy periodontium) and code 4 (pocket depth of 6mm and more) at last in that specific order. Many studies demonstrated that code 1 is the most prevalent code^(23,24).

A high prevalence rate of PDs was demonstrated in many epidemiological studies among college students in Iraq^(11-16,25). Also, other studies in many countries around the world recorded a high prevalence of PDs⁽²⁶⁻³²⁾.

Association between different variables and highest CPITN codes

Age

A significant correlation was exited between age groups and highest CPITN codes. Overall, PDs prevalence and severity increase with age, which is agree with another studies which found that increasing severity of PDs is due to the untreated cumulative effect of the disease process over time rather than aging process^(28,33,34).

A study by⁽³⁵⁾ demonstrated that periodontal health status becomes worse with increasing age. Another study by⁽³⁶⁾ revealed the same result and recorded that the percentages of the shallow and deep

pockets increase along with age, thus indicating that PDs are associated with age.

Gender

In the current study, there was a significant difference between both genders with the highest CPITN codes in the present study, hence, female students tend to have healthier periodontium than male students. A recent study⁽³⁷⁾ demonstrated that males had higher prevalence and severity of PDs than females. Another studies also revealed the same result^(24,38,39). A study by⁽⁴⁰⁾ revealed that there was a significant difference between males and females in calculus and pocket more than 5mm depth, females tended to have a higher percentage of healthy gingiva. While the non-significant difference in the prevalence of PDs between females and males was revealed in a study done by⁽⁴¹⁾. But a contrasted result from a study by⁽³¹⁾ in which the prevalence of PDs higher in females than males was demonstrated.

Males are higher exposed to harmful oral habits such as smoking, which are recognized as high-risk factors for PDs, whereas females are more aware to maintain good oral hygiene as well as receiving regular professional dental care, which may explain why females generally have more favorable results in most of the studies⁽⁴²⁾.

Socioeconomic status

A statistically significant correlation was exited between the highest CPITN codes and different levels of SES.

The results of the study agreed with a study done by⁽⁴³⁾ that show a positive association between socioeconomic status and periodontal health status; hence, PDs was common in subjects with low SES when compared to subjects with very good SES. Another study by⁽⁴⁴⁾ recorded a significant relationship between PDs and socioeconomic factors. A study by⁽⁴⁵⁾ shows that gingival bleeding, plaque accumulation and the proportion of individuals with periodontal diseases decreases as SES increases. Subjects with poor education and reduced SES are at significantly higher risk for the development of PDs than those without these risk factors⁽⁴⁶⁾.

The lower income group exhibits worse periodontal health behavior because they fail to make preventative dental checkups. This association is consistent with another report that had connection between low SES, inaccessibility to dental clinics, and unawareness of oral hygiene ⁽⁴⁷⁾. However, income can be a barrier to obtaining dental services and the availability of dental insurance, individuals with lower income may be unaware of the importance of receiving dental care ⁽⁴⁸⁾.

Marital status

A non-Significant association existed in this study between single and married students with the highest CPITN codes. Single students tend to have better periodontal health conditions (healthier periodontium, less calculus and less pockets of any depth) when compared to married students.

The findings of the current study were recorded in another study by ⁽⁴⁹⁾ who showed that single participants demonstrated a higher percentage of healthy periodontium (14.2%) when compared to married participants (8.2%). Another study by ⁽⁵⁰⁾ stated that married patients are at higher risk of periodontitis compared to those who are single.

The underlying cause for the higher prevalence of PDs severity among married couples may be related to their higher indulgence in dental care practices than single students, as well as to their high financial responsibilities, so less attention paid by them to preventive dental practices ⁽²⁵⁾.

Lifestyle

A significant association was found between the highest CPITN codes with lifestyle groups. The healthy periodontium was observed highest in the students with good lifestyles.

The findings in the present study agreed with a study by ⁽²²⁾ showed that lower prevalence of PDs among participants with a good lifestyle when compared to those with a poor lifestyle. A strong correlation between lifestyles and periodontal health status in a study by ⁽⁵¹⁾ revealed that subjects with an unhealthy lifestyle had poor periodontal status compared to healthy lifestyle. Another study by ⁽⁵²⁾ stated that unhealthy lifestyle was associated with a higher prevalence of periodontal pocketing and gingival symptoms, while a healthy lifestyle was associated with good periodontal health status. Bleeding in the present study represents the highest code among good lifestyle and this finding agreed with another study ⁽²⁵⁾, the reason for this result is due to other factors included in this study like SES. Individuals with unhealthy lifestyles had poor periodontal health status due to their aberrant brushing habits and the negative impact of smoking ⁽⁵³⁾.

Conclusion

The current study shows a higher prevalence rate of bleeding and calculus among final year undergraduate students in Al-Qadisiyah colleges and institute with a lack of awareness about periodontal health status. Also, there is a strong association of age, gender, marital status, socioeconomic status and lifestyles with periodontal health status. It is important to increase the student's knowledge toward PDs, its symptoms, signs, and consequences for general health. Also, there is a need to motivate students to change their lifestyle to a healthy lifestyle and explain its effect on oral health.

Table (1): The HPI eight item.

Variables of lifestyle		Poor	Good
1	Smoker	Present Past	Never
2	Alcohol	Almost every day	About 3-5 per week About 1-2 per week About 1-3 per week About 1-10 per week None
3	Breakfast	Sometimes Not	Almost every day
4	Sleep/night	>=9 h 6 h <=5 h	8 h 7 h
5	Work/day	>=11 h 10 h	9 h 8 h <=7 h
6	Exercise	About 1 per month Not	Almost every day About 2-4 per week About 1per week
7	Diet	Eat with little attention. Do not eat a balanced diet	Eat a balanced diet
8	Stress	Feel excessive stress	Feel mild stress Feel slight stress

Table (2): Distribution of the students according to the periodontal health status.

CPITN	Number	Percentages
Healthy periodontium	123	15.4%
Bleeding	252	31.5%
Calculus	251	31.4%
4-5 mm pocket depth	147	18.4%
6 mm or more pocket depth	27	3.4%
Total	800	100 %

Table (3): Statistical analysis and distribution of students according to their highest CPITN codes by age

CPITN Codes	Age				Statistical analysis
	18-19 years No. (%)	20-29 years No. (%)	30-39 years No. (%)	Total No. (%)	
Healthy periodontium	26(56.5)	97(12.9)	0(0)	123(15.4)	$\chi^2=72.828$, DF=8 (P<0.05) (S)
Bleeding	10(21.7)	242(32.2)	0(0)	252(31.5)	
Calculus	8(17.4)	241(32.1)	2(50)	251(31.4)	
Pocket depth 4-5 mm	2(4.3)	144(19.2)	1(25)	147(18.4)	
Pocket depth 6 mm or more	0(0)	26(3.5)	1(25)	27(3.4)	
Total	46 (100%)	750(100%)	4(100%)	800 (100%)	

Table (4): Statistical analysis and distribution of students according to their highest CPITN codes by gender

CPITN codes	Male No. (%)	Female No. (%)	Total No.(%)	Statistical analysis
Healthy periodontium	29(8.2)	94(21)	123(15.4)	$\chi^2=148.749$, DF= 4 P \leq 0.05 (S)
Bleeding	66(18.8)	186(41.5)	252(31.5)	
Calculus	117(33.2)	134(29.9)	251(31.4)	
Pocket depth 4-5 mm	116(33)	31(7)	147(18.4)	
Pocket depth 6 mm or more	24(6.8)	3(0.6)	27(3.4)	
Total	352(100)	448(100)	800 (100)	

Table (5) : Statistical analysis and distribution of the students according to their highest CPITN codes by socioeconomic status

CPITN Codes	Socioeconomic status				Total No. (%)	Statistical analysis
	Very good No. (%)	Good No. (%)	Acceptable No. (%)	Low No. (%)		
Healthy periodontium	13(50)	71(20.4)	37(9.2)	2(8.7)	123(15.4)	$\chi^2=95.868$ DF=12 P <0.001 (S)
Bleeding	9(34.6)	127(36.5)	113(28.1)	3(13.1)	252(31.5)	
Calculus	4 (15.4)	105(30.2)	132(32.7)	10(43.4)	251(31.4)	
Pocket depth 4-5mm	0 (0)	44(12.6)	99(24.6)	4(17.4)	147(18.4)	
Pocket depth 6 mm or more	0(0)	1(0.3)	22(5.4)	4(17.4)	27(3.4)	
Total	26(100)	348(100)	403 (100)	23(100)	800(100)	

Table (6):Statistical analysis and distribution of the students according to their highest CPITN codes by marital status.

CPITN codes	Single No.(%)	Married No.(%)	Total No.(%)	Statistical analysis
Healthy periodontium	116(16.5)	7(7.2)	123(15.4)	$\chi^2=6.674$ DF=4 P>0.05 (NS)
Bleeding	222(31.6)	30(31)	252(31.5)	
Calculus	214(30.4)	37(38.1)	251(31.4)	
Pocket depth 4-5 mm	128(18.2)	19(19.6)	147(18.4)	
Pocket depth 6 mm or more	23(3.3)	4(4.1)	27(3.4)	
Total	703(100)	97(100)	800 (100)	

Table (7): Statistical analysis and distribution of students according to their highest CPITN codes by their lifestyles

CPITN Codes	Lifestyle Index			Total No. (%)	Statistical analysis
	Good No. (%)	Moderate No. (%)	Poor No. (%)		
Healthy periodontium	79 (22.6)	40(12.5)	4 (3.1)	123(15.4)	$\chi^2=107.807$ DF=8 P \leq 0.05 (S)
Bleeding	135 (38.6)	99(31.1)	18 (13.7)	252 (31.5)	
Calculus	99(28.3)	100(31.3)	52 (39.7)	251 (31.4)	
Pocket depth 4-5 mm	34(9.7)	70(22)	43 (32.8)	147 (18.4)	
Pocket depth 6mm or more	3(0.8)	10(3.1)	14 (10.7)	27 (3.4)	
Total	350(100)	319(100)	131(100)	800(100)	

References

1. Rozier RG. Dental Public Health. In Wallace RB ed, Public Health and Preventive Medicine , Washington ; Prentice Hall International Inc 1998; 1091-1112.
2. Slots , J. Periodontitis: Facts, fallacies and the future. *Periodontology* 2000 2017; 75: 7-23.
3. Schatzle M, Loe H, Burgin W , Anerud A , Boysen H, et al . Clinical Course of Chronic Periodontitis . I. Role of Gingivitis . *J Clin Periodontol* 2003; 30:887-901.
4. Jassim, S. D. Effects of Age, Gender and Educational Level on the Severity of Chronic Periodontitis. *Medical Journal of Babylon* 2017; 14 (4): 657-662.
5. Poul E Petersen, Pierre C Baehni. Periodontal health and global public health. *Periodontology* 2000 2012; 60 (1): 7-14.
6. Hajishengallis G, Darveau RP , Curtis MA. The keystone-pathogen hypothesis. *Nat Rev Microbiol* 2012; 10(10) :717-25.
7. Lamont RJ , Hajishengallis G. Polymicrobial synergy and dysbiosis in inflammatory disease . *Trends in Molecular Medicine* 2015; 23(3): 172-83.
8. Bergström, J. Tobacco smoking and chronic destructive periodontal disease. *Odontology* 2004;92: 1-8.
9. Shi, B., Chang, M., Martin, J., Mitreva, M., Lux, R., Klokkevold, P., Sodergren, E., Weinstock, G. M., Haake, S. K. and Li. H. Dynamic changes in the subgingival microbiome and their potential for diagnosis and prognosis of periodontitis. *MBio* 2015;6 (1): e01926-14.
10. Ainamo, J., Barmes, D., Beagrie, G., Cutress, T., Martin, J. and Sardo-Infirri, J. Development of the World Health Organization (WHO) community periodontal index of treatment needs (CPITN). *International Dental Journal* 1982: 32(3): 281-91.
11. Abdul-Karim A. A AL-Muhamadawy. Periodontal health status and treatment needs among Iraqi dental students. *Journal of the Faculty of Medicine Baghdad* 2009; 51 (4): 378-381.
12. AL-Shahwani, R.M. and Ibrahim, L.M. 2004. Comparison of periodontal health status and treatment needs between the Arab and Kurds in northern Iraq . M.Sc. Thesis, College of Dentistry, University of Baghdad.
13. Ahmed, M.M. and Ahlam, T.M. Oral health status among fifteen year old students in Maysan governorate- Iraq. *Journal of Baghdad College of Dentistry* 2014; 26(4): 147-151.
14. AL-Alousi, M.T., AL-Safi, K.A. and Ibrahim. L.M. Periodontal health status and treatment needs among the young adult and adults in AL-Anbar governorate. *Journal of Baghdad College of Dentistry* 2009; 21(3): 99-102.
15. Abdullah, M.I. and AL- Waheb, A.M. 2013. Oral health status and treatment need among workers of EL-Kubaisa cement factory in Anbar Governorate. M.Sc. Thesis, College of Dentistry, University of Baghdad.
16. Ahmed, Z.N and Ahmed M.A..A. Prevalence of Periodontal Diseases among Pregnant Women in Al-Najaf Center, Al-Najaf Governorate, Iraq. *Journal of Research in Medical and Dental Science* 2021; 9(7): 140-148.
17. Charan, J., & Biswas, T. How to calculate sample size for different study designs in medical research?. *Indian journal of psychological medicine* 2013; 35(2): 121-126.
18. WHO .Basic principles of clinical oral health surveys .Oral Health Surveys, Basic Methods.5th .World health organization 2013;11-19.
19. Marya, C.M. Dental Indices. A Practical Manual of Public Health Dentistry.1st ed. Jaypee Brothers Medical Publishers 2012; 146-220.
20. Basha, S., Mohammad, R.N., Swamy, H.S. and Sexena, V. Association between traumatic dental injury, obesity, and socioeconomic status in 6-and 13-year-old schoolchildren . *Social work in public health* 2015; 30 (4),:336-344.
21. Morimoto K. Life-style and genetic factors that determine the susceptibility to the production of chromosome damage. In: Obe G, Natarajan AT, editors. *Chromosomal Aberrations: Basic and Applied Aspects*. Berlin: Springer-Verlag; 1990. pp. 287–301.
22. Singla, N., Acharya, S., Prabhakar, R. V., Chakravarthy, K., Singhal, D., & Singla, R. The impact of lifestyles on the periodontal health of adults in Udupi district: A cross sectional study. *Journal of Indian Society of Periodontology* 2016; 20(3): 330-335.
23. Taani Q .The periodontal status of Jordanian adolescents measured by CPITN. *International Dental Journal* 1995;45 (6):382-385.
24. ALmugeiren, O. M. Assessment of periodontal status among the outpatients attending private university dental clinics in Riyadh city, Saudi Arabia. *Journal of International Oral Health* 2018; 10 (4): 192-197.
25. Jebur, H. J. and Ahmed, M.A.A. Periodontal health status and treatment needs among college students in Al Basrah governorate, Iraq: cross-sectional study. *Biochemical and Cellular Archives* 2020; 20(1).
26. Holtfreter, B., Schwahn, C., Biffar, R. and Kocher, T . Epidemiology of periodontal diseases in the Study of Health in Pomerania. *Journal of clinical periodontology* 2009;36 (2): 114-123.
27. AL-Sultani, H. F. Prevalence and Severity of Dental Caries, Periodontal Diseases and Dental Erosion among (20–40) Years Old Pregnant Women in Hilla city, Babylon governorate-Iraq. *Medical Journal of Babylon* 2013;5 (6), 7 .
28. Sekhon, T. S., Grewal, S. and Gambhir, R. S. Periodontal health status and treatment needs of the rural population of India: A cross- sectional study. *Journal of natural science, biology, and medicine* 2015 ;6 (1): 111- 115.
29. Vinnakota, N. R., Bommireddy, V. S. , Pachava, S., Ravoori, S., Talluri, D. and Sanikommu, S. Assessment of periodontal health among jail inmates of Guntur city Andhra Pradesh:

- A cross-sectional study. *Journal of Dr. NTR University of Health Sciences* 2016; 5 (3): 200-203.
30. Cengiz, M. İ., Zengin, B., İçen, M., & Köktürk, F. Prevalence of periodontal disease among mine workers of Zonguldak, Kozlu District, Turkey: a cross-sectional study. *BMC public health* 2018; 18(1): 1-7.
31. Malakar, M., Ravishankar, P. L., Saravanan, A. V., Rao, K. S. and Balaji, R. Prevalence of periodontal disease and oral hygiene practices in Kancheepuram District population: An epidemiological study. *Journal of Pharmacy & Bioallied Sciences* 2021; 13 (Suppl 2) :S1517-S1522.
32. Aguirre, G. A., Quezada, R. F., Escobar, W. Y., Aguirre, K. A., Miguel, A.G. and Rivas, F. J. Oral Health Profile Status and Treatment Needs in the Salvadoran Elderly Population. *BMC Oral Health* 2022;22 (1):1-8.
33. Agarwal, V., Khatri, M., Singh, G., Gupta, G., Marya, C.M. and Kumar, V. Prevalence of periodontal diseases in India. *Health Care* 2010; 44 (3).
34. Bansal, B., Mittal, N. and Singh. T.B. Assessment of the prevalence of periodontal diseases and treatment needs: A hospital-based study. *Journal of Indian Society of Periodontology* 2015;19 (2): 211-215.
35. Alwan, A.H., Alanbari, B. F., Alghazali, M. W., Hussain, A.A., Farah Abdul_Razzak Mahmood Al_Bazaz. Evaluation of the Effect of Patient Related Factors on Periodontal Condition in a Sample of Iraqi Population: A Retrospective Study. *Journal of Medicinal and Chemical Sciences* 2023; 6 (5) :1010-1031.
36. Susanto, A., Carolina, D.N., Amaliya, A., Pribadi, I.S. and Miranda, A. Periodontal health status and treatment needs of the community in Indonesia: A cross sectional study. *Journal of International Oral Health* 2020;12 (2):114-119.
37. Jasim, H. H. and Al-Jebouri, M. M. The relationship between periodontal disease and predisposing factors. *Tikrit Journal for Dental Sciences* 2016; 4: 68-80.
38. Batra, M., TANGADE, P. and GUPTA, D. Assessment of periodontal health among the rural population of Moradabad, India. *J Indian Association Public Health Dentistry* 2014;12(1):28-32.
39. Shah, P., Rajasekar, A. and Chaudhary, M. Assessment of Gender Based Difference in Occurrence of Periodontal Diseases: A Retrospective Study. *Journal of Contemporary Issues in Business and Government* 2021;27 (2): 521-526
40. Karama MT AL-Nuaimy. Dental Health Status Among Adult Population in Mosul City. *Tikrit Journal for Dental Sciences* 2015; 3 (1): 105-111.
41. Baishya, B., Satpathy, A., Nayak, R. and Mohanty, R. Oral hygiene status, oral hygiene practices and periodontal health of brick kiln workers of Odisha. *Journal of Indian Society of Periodontology* 2019; 23 (2): 163-167.
42. Chinmaya, B.R., Shaik. H.A., Srivastava, B.K. and Pushpanjali, K. Oral health Status and treatment needs in Chitradurga, India and strategies to meet the needs. *Indian Association Of Puplic Health Dentistry* 2011;1:14-25.
43. Rajasekar, A. and Ganapathy, D. Periodontal Health in Children and Adolescents- A Comparative Study. *Annals of the Romanian Society for Cell Biology* 2021; 25 (4):1583-6258.
44. Kumari, M., Kumar, M., Shankar, B., Niraj, L.K., Rajeev, A., Khan, A. Relationship between socioeconomic factors and periodontal disease—a cross-sectional study. *Journal of Research and Advancement in Dentistry* 2021;12(5):1-4.
45. Oppermann, R.V. An overview of the epidemiology of periodontal diseases in Latin America. *Brazilian Oral Research* 2007;21: 8-15.
46. Javed, F., Al-Hezaimi, K., Tenenbaum, H. C., Getulio Nogueira-Filho, Faisal Qayyum, Fernanda O Bello Correa, Samaranayake, L.P. Severity of periodontal disease in individuals chewing betel quid with and without tobacco. *The American journal of the medical sciences* 2013; 346 (4): 273-278.
47. Savage, M.F., Lee, J. Y., Kotch, J.B., Vann, W.F. Early preventive dental visits: effects on subsequent utilization and costs. *Diatrics* 2004; 114 (4): e418-e423.
48. Bayat, F., Vehkalahti, M.M., Tala, H. and Zafarmand, A.H. Dental attendance by insurance status among adults in Tehran, Iran. *International dental journal* 2006;56 (6):338-344.
49. Renata De Souza Coelho, Estela Santos Gusmão, Renata Cimões Jovino-Silveira, Arnaldo De França Caldas Junior. Profile of periodontal conditions in a Brazilian adult population. *Oral Health and Preventive Dentistry* 2008;6 (2): 139-145.
50. Madi, M., Pavlic, V., Alammari, S. M., Alsulaimi, L.M., Alotaibi, R. S., AlOtaibi, G.M. and Zakaria, O. The association between vitamin D level and periodontal disease in Saudi population, a preliminary study. *The Saudi Dental Journal* 2021;33 (7): 595-600.
51. Gundala, R. and Chava, V. K. Effect of lifestyle, education and socioeconomic status on periodontal health. *Contemporary clinical dentistry* 2010; 1(1): 23-26.
52. Shizukuishi, S., Hayashi, N., Tamagawa, H., Hanioka, T., Maruyama, S., Takeshita, T. and Morimoto, K. Lifestyle and periodontal health status of Japanese factory workers. *Annals of Periodontology* 1998;3 (1): 303-311.
53. De, A., Das, S., Rajashree, S., Ganguly, Das, I. and Saha, A.P. Evaluation of Impact of Lifestyle and Educational Status on Periodontal Health: A Cross Sectional Study. *Journal of Research and advancement in Dentistry* 2021;11(2):171-175.

