

Prevalence and Distribution of Dental Caries among Iraqi People

Hassan Faleeh Farhan Al-Sultani¹, Israa Hussein Ali¹, Sarah Yousif Alkhafaji¹, Ahmed Ghanim Alhelal²

¹Departments of Pediatric and Preventive Dentistry, College of Dentistry, University of Babylon, Hilla, Babil, Iraq, ²Department of Conservative Dentistry, College of Dentistry, University of Babylon, Hilla, Babil, Iraq

Abstract

Background: Dental caries is the most prevalent oral disease worldwide. It is still a public health problem, particularly in developing countries. **Objectives:** The aim of this study was to measure the occurrence of dental caries among patients attending dental school and to investigate the type of dental caries by age, sex, and geographic area. **Materials and Methods:** After obtaining an appropriate ethical approval, the occurrence and type of dental caries according to G.V. Black classification were recorded among all patients aged 16 years and over during routine dental treatment at the dental hospital, College of Dentistry, University of Babylon, Hillah city, Babil governorate. World Health Organization' criteria were used to diagnose and detect dental caries. **Results:** The final sample size was 463 individuals distributed as 217 (46.87%) men and 246 (53.13%) women. Overall, 1851 carious lesions were noticed, in which class I (68%) represents the most prevalent type of dental caries in the study sample followed by class II (20%), then class III (6%), and the least prevalent types (3%) were class IV and class V. There was no significant difference regarding the effect of gender on different caries classes ($P > 0.05$). However, a significant difference was recorded regarding the effect of area of residence on different caries classes ($P < 0.05$). **Conclusions:** In this study, high percentage of class I lesions in comparison to other classes of Black's classification was noticed among the examined patients. Women experienced more dental caries than men and the area of residency had a significant impact on caries experience.

Keywords: Dental caries, distribution, Iraqi, prevalence

INTRODUCTION

Dental caries is the most prevalent oral disease in humans. Dental caries is regarded as a public health problem affecting aesthetic, speech, and eating and has a negative impact on the oral health related quality of life.^[1,2] The global prevalence of dental caries is still high^[3] and ranged from 49% to 83% worldwide.^[4] Research has shown that the international prevalence of dental caries is declining, particularly in high-income countries due to using effective oral health care programs and adopting various preventive measures (e.g., fluoride therapy, fissure sealants, etc.).^[5] However, it is still a public health problem, particularly in developing countries, which could be due to limited dental facilities, low dental knowledge, and high sugar consumption.^[2,6] There is also a regional difference in the prevalence and distribution of dental caries across different countries and within the same country.^[7]

Different caries classification systems were used to classify dental caries such as G.V. Black's Classification of Dental Caries,^[8] the International Caries Detection and Assessment System,^[9] and the American Dental Association Caries Classification System.^[10] The first classification is the oldest and most popular tool for recording dental caries by many researchers.^[11,12] In accordance with this classification, a study in Iraq showed that Class I occlusal surface caries was more prevalent among other types of carious lesions.^[12]

Address for correspondence: Dr. Israa Hussein Ali,
Department of Pediatric and Preventive Dentistry, College of Dentistry,
University of Babylon, Hilla 51002, Babil, Iraq.
E-mail: dent.israa.ali@uobabylon.edu.iq

Submission: 05-Jan-2023 **Accepted:** 01-Feb-2023 **Published:** 24-Sep-2024

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Al-Sultani HF, Ali IH, Alkhafaji SY, Alhelal AG. Prevalence and distribution of dental caries among Iraqi people. Med J Babylon 2024;21:511-5.

Access this article online

Quick Response Code:



Website:
<https://journals.lww.com/mjby>

DOI:
10.4103/MJBL.MJBL_16_23

To establish “a global oral health data bank,” the World Health Organization (WHO) has launched 5 years epidemiological oral health to monitor the occurrence and distribution of oral diseases including dental caries.^[13] It also developed basic oral health survey criteria using specific index age groups to estimate the “burden” of oral diseases including dental caries. For example, 5 years age group is used for primary dentition; 12 years age group is used for permanent dentition, 35–44 years and 65 years and over age groups represent adulthood and geriatric population respectively.^[7] Robust disease surveillance/reporting system and thoroughly managed oral health surveys are the main sources of the presently existing data in the “global oral health data bank.”^[14] Such data are important in establishing a successful oral health care system and good health policymaking.

Published reports from Iraq about various medical and dental conditions are rich,^[15-17] however, those related to the prevalence and severity of dental caries are still few and targeting certain age groups.^[18-20] However, they all indicate that dental caries is prevalent among Iraqi population. For example, Al-Sultani, 2013 (7) reported a high prevalence (74%) of dental caries among 20–40 years old pregnant women. Another Iraqi study showed that caries experience was significantly higher in women than men.^[21] Giving the wide ethnic, geographic, and cultural diversity of Iraq, the prevalence and distribution of dental caries could be varied accordingly. With the absence of surveillance and response systems and a comprehensive national oral health survey for all age groups in Iraq, data about dental caries remain few. This in turn may lead to fail to persuade “policy makers” to list oral diseases including dental caries as public health problems and giving them the priority during conducting oral health care programs. Therefore, the aim of this study was to measure the occurrence of dental caries among patients attending dental school and to investigate the type of dental caries in relation to age, gender and area of residency. The null hypothesis is there was no difference between gender and area of residency in relation to caries classification. The alternative hypothesis is that there was a difference between gender and area of residency in relation to caries classification.

MATERIALS AND METHODS

In the present study, the sample size comprised 463 individuals aged 16 years and over. All cases were patients, who visited the dental hospital at dental school, university of Babylon, Hillah city, Babil governorate. Patients from both genders aged 16 years and over were invited to take part in the study by giving them participant information sheet of the study that explain the purpose and aim of the study. Patients with systemic diseases were excluded from the study. Participants were randomly selected using simple random sampling technique in which every

individual has an equal chance to be a participant in the study. After obtaining an appropriate ethical approval from the university committee, all participants were asked to sign the consent form of the study. Specific clinical form including demographic data presented to the patients at conservative department was used to record the prevalence and distribution of dental caries according to G.V. Black classification.^[8]

G. V. Black classified carious lesions by location as follow:

- Class I: These are including occlusal surface, buccal, and lingual pits of posterior teeth and lingual surface of anterior teeth.
- Class II: These are involving proximal surface of posterior teeth.
- Class III: These are involving proximal surface of anterior teeth that do not include the incisal edge.
- Class IV: These are involving the proximal surface of anterior teeth that include the incisal edge.
- Class V: These are involving the gingival third of the facial or lingual surface of all teeth.

Filling out the form, in addition to the clinical examination was done by undergraduate dental students under the supervision of specialist dentists in conservative dentistry. Inter and intra examiner calibrations using paired *t* test were performed to ensure the consistent application of the diagnostic criteria through duplicate examinations of 20 patients. WHO criteria^[13] were used to diagnose and detect dental caries. The criteria involve that “dental caries were clinically recorded as present when a lesion in a pit or fissure or on a smooth surface had a detectable softened floor, undermined enamel or softened wall.” On Proximal surface, it had to be certain that the explorer had entered the lesion or taking bitewing radiograph for any doubt existed caries.” Carious lesions on cusp tip or incisal aspect were not included in the study, as these were already excluded from G.V. Black’ classification. The diagnosis of questionable interproximal carious lesions was confirmed by taking batwing radiographs under supervision of professional dentists.

Statistical analysis

The data were entered and analyzed with SPSS version 13.1.220 (StataCorp LP, Texas). Shapiro-Wilk normality test was applied to test normality distribution. Independent sample *t* test was used to check whether gender and area of residence have an effect on the occurrence of different caries classes. The significance level was set at *P*-value <0.05.

Ethical approval

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients verbal and analytical approval before sample was taken. The study

protocol and the subject information and consent form were reviewed and approved by a local ethics committee according to the document number 1640 on July 9, 2020. However, data collection was done between January 1 and March 1, 2022.

RESULTS

Statistical analysis for both inter and intra calibrations showed no significant differences between observations ($P > 0.05$). Using independent sample t test power calculation, it was estimated that 500 patients would provide 80% power to detect a significant difference between the mean values of caries classification scores in relation to gender and area of residency, at a significance level of $\alpha = 0.05$. However, the final sample size included 463 individuals distributed with 217 (46.87%) men and 246 (53.13%) women.

The results showed that the data of this study were normally distributed, in which Shapiro-Wilk test values were 0.96 ($P > 0.05$). The distribution of individuals according to age groups, gender, and area of residency is shown in Table 1. The table shows that the majority of the sample (52%) aged 16–25 years with gradual decrease as the age increased. Gender distribution showed that the total women participated in the current study (53%) was marginally higher than men (47%) but this distribution was variable among the different age groups. Higher percentage of the samples were from urban areas (65%).

Table 2 illustrates the distribution of dental caries according to G.V. Black classification by age and gender. Overall, 1851 carious lesions were noticed in which class I (68%) represents the most prevalent type of dental caries in the study sample followed by class II (20%), then

class III (6%) and the least prevalent types (3%) were class IV and class V.

To test the effect of gender and area of residency on the different caries classes, the independent sample t test was applied as shown in Figures 1 and 2, respectively. There was no significant difference regarding the effect of gender on different caries classes ($P > 0.05$). However, a significant difference in mean was recorded regarding the effect of area of residence on different caries classes ($P < 0.05$) in which dental caries was higher in urban area than rural area.

DISCUSSION

The current study used G.V. Black classification of dental caries to assess the distribution of dental caries among a sample of Iraqi people. G.V. Black classification has been used in many studies^[22-24] because it is simple, straightforward, and clinically applicable in the diagnosis of carious lesions.

The results showed high percentage (68%) of caries lesions were recorded as class I compared to other classes. Such findings coincided with other studies^[22,23] that reported high percentage of class I caries lesions. This may be attributed to high occlusal caries probably due to deep pits and fissures that act as retentive means for cariogenic foods (e.g., sugar and refined carbohydrates).^[25,26]

More than half of the samples are individuals aged 16–25 years suggesting high caries prevalence among them possibly due to environmental, behavioral, and dietary factors,^[27,28] which probably have high impact on this age group than other groups. Another justification for

Table 1: Distribution of individuals according to different age groups by gender and area of residency

Age groups	No. of cases (%)	Male	Female	Urban	Rural
16–25	237 (52%)	95	140	151	85
26–35	86 (18%)	52	35	55	32
36–45	69 (15%)	35	35	49	20
46–55	42 (9%)	18	24	28	15
56–65	29 (6%)	17	12	19	9
Total	463 (100%)	217 (47%)	246 (53%)	302 (65%)	161 (35%)

Table 2: Distribution of dental caries classes by age and gender

Age groups	Class I		Class II		Class III		Class IV		Class V	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
15–25	293	398	51	73	8	18	12	4	4	7
26–35	163	74	73	27	14	18	9	2	11	0
36–45	72	101	53	50	14	15	0	13	12	3
46–55	44	57	13	20	6	6	1	0	2	5
56–65	19	33	11	5	12	6	1	4	13	1
Total	591	663	201	175	54	63	23	23	42	16
1851	1254 (68%)		376 (20%)		117 (6%)		46 (2.5%)		58 (3%)	

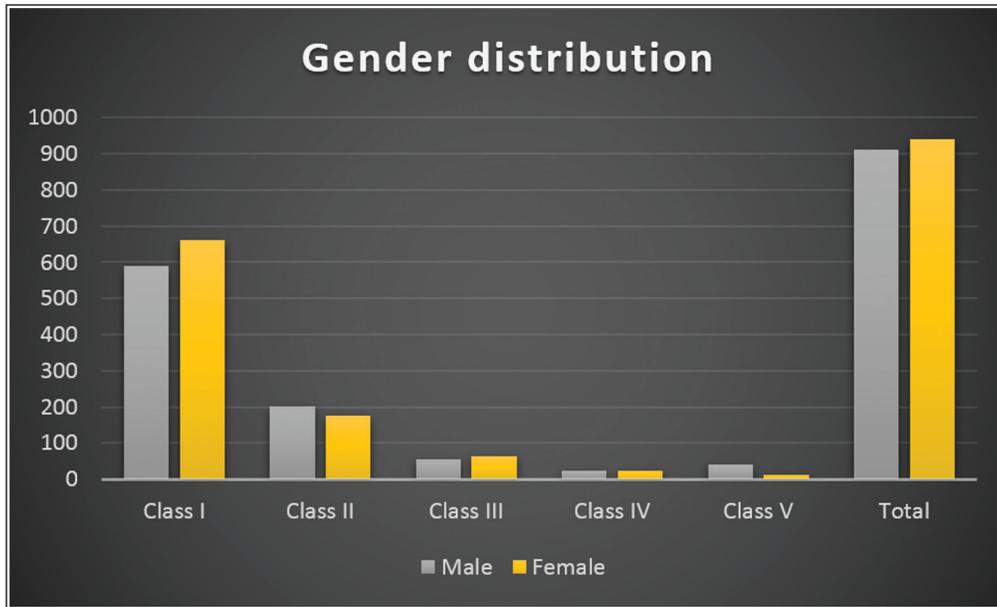


Figure 1: Distribution of different caries classes by gender

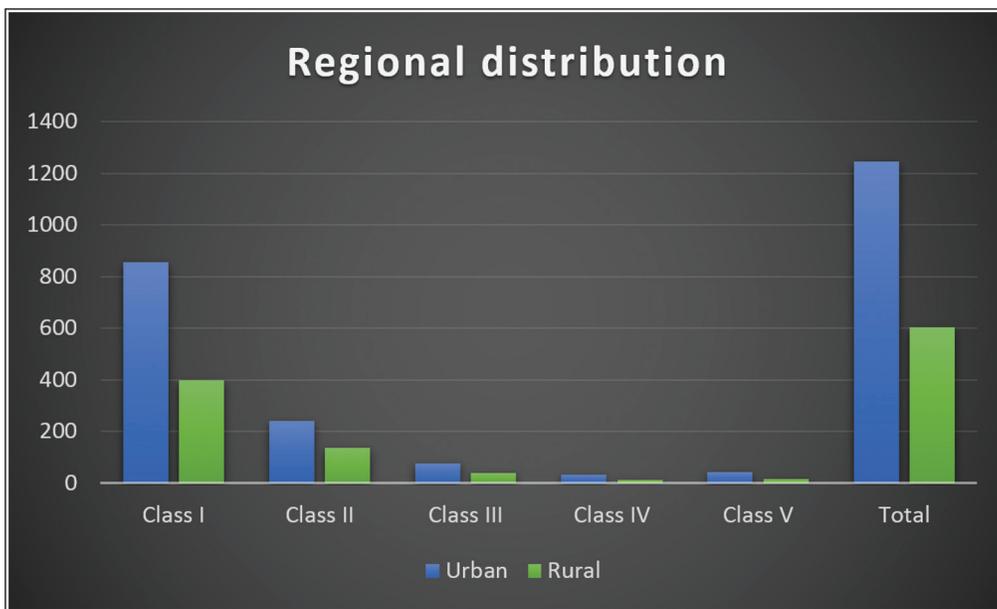


Figure 2: Distribution of different caries classes by area of residency

this high young percentage may reflect the community in Iraq could generally having more young individuals than adult or older people.

With respect to gender difference, the results revealed slightly more women patients attending the dental clinics than men, which could be linked to a high caries prevalence among women than men. Such a finding is in agreement with the findings of other studies,^[22,29-31] which reported a high caries rate among women than men. The high caries prevalence among women could be due to early teeth eruption in girls in comparison to boys, owing to the difference in dietary pattern between housewives and working men^[29,32] and hormonal disturbances during pregnancy.^[22,29,30] It may be

because women are more concerned about their oral health and appearance; therefore, they are seeking treatment slightly more than men.^[33,34]

Individuals from urban areas were found to be more affected by dental caries than those from rural areas in the present study. High caries prevalence among individuals living in urban areas is strongly attributed to availability of markets and exposure of individuals to cariogenic foods.^[35] However, the pattern of influence of dental caries on urban and rural areas now is changing, with more dental caries affecting individuals living in rural areas than urban areas due to change in dietary habits, socioeconomic factors and level of access to dental resources in rural areas.^[36,37] Higher

number of individuals, who attend the dental hospital from urban areas than those from rural areas, could influence the percentage of caries classes in the current study.

CONCLUSIONS

In this research, high percentage of class I lesions in comparison to other classes of G.V. Black's classification was noticed among the population examined. Though it was statistically not significant, women experienced more dental caries than men and the area of residency had a significant impact on caries experience. The findings of this study could be useful as a baseline data to estimate the burden of dental caries among Iraqi population to establish appropriate preventive and treatment programs to control dental caries.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Peres MA, Macpherson LMD, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: A global public health challenge. *Lancet* 2019;394:249-60.
- Peres MA, Daly B, Guarnizo-Herreño CC, Benzian H, Watt RG. Oral diseases: A global public health challenge—Authors' reply. *Lancet* 2020;395:186-7.
- Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, et al. Dental caries. *Nat Rev Dis Primers* 2017;3:17030.
- Frencken JE, Sharma P, Stenhouse L, Green D, Laverty D, Dietrich T. Global epidemiology of dental caries and severe periodontitis—A comprehensive review. *J Clin Periodontol* 2017;44:S94-S105.
- Lagerweij MD, Van Loveren C. Declining caries trends: Are we satisfied? *Curr Oral Health Rep* 2015;2:212-7.
- Alsuraimeh BS, Han D-H. Effect of globalization on global dental caries trend. *Medicine (Baltimore)* 2020;99:e21767.
- Bali R, Mathur V, Talwar P, Chanana H. National Oral Health Survey and Fluoride Mapping 2002–2003 India. New Delhi: Dental Council of India; 2004. p. 132.
- Black GV. Extracts from the last century. Susceptibility and immunity by dental caries by G.V. Black. *Br Dent J* 1981;151:10.
- Ismail AI, Sohn W, Tellez M, Amaya A, Sen A, Hasson H, et al. The International Caries Detection and Assessment System (ICDAS): An integrated system for measuring dental caries. *Commun Dent Oral Epidemiol* 2007;35:170-8.
- Young DA, Nový BB, Zeller GG, Hale RG, Hart TC, Truelove EL. The American Dental Association Caries Classification System for clinical practice: A report of the American Dental Association Council on Scientific Affairs. *J Am Dent Assoc* 2015;146:79-86.
- Tan JHS, Fadil M, Aripin D. Prevalence of dental caries based on gender, age, Black's classification and its distribution on different teeth. *Padjadjaran J Dent* 2013;25:158-62.
- Talabani R, Al-Zahawi A, Ibrahim R. Prevalence and distribution of dental caries experience according to GV black classification for patient attending to dental school. *J Oral Health Commun Dent* 2015;9:60-3.
- World Health Organization. Oral Health Surveys: Basic Methods. 5th ed. Geneva: World Health Organization; 2013.
- Collaborators GOD, Bernabe E, Marcenes W, Hernandez C, Bailey J, Abreu L, et al. Global, regional, and national levels and trends in burden of oral conditions from 1990 to 2017: A systematic analysis for the global burden of disease 2017 study. *J Dent Res* 2020;99:362-73.
- Abbas SJ. Health-related quality of life of knee osteoarthritis patients. *Med J Babylon* 2022;19:463.
- Mohammed AM, Al-Rawi RA, Abdulmajeed BY, Ayoub NI. The relationship between blood pressure and body mass index among primary-school children. *Med J Babylon* 2022;19:482.
- Al-Noaman AS. Influence of oral bisphosphonate on dental implant: A review. *Med J Babylon* 2022;19:180.
- Ahmed NA, Aström AN, Skaug N, Petersen PE. Dental caries prevalence and risk factors among 12-year old schoolchildren from Baghdad, Iraq: A post-war survey. *Int Dent J* 2007;57:36-44.
- Al-Mendalawi MD, Karam NT. Risk factors associated with deciduous tooth decay in Iraqi preschool children. *Avicenna J Med* 2014;4:5-8.
- Al Mousawi A, Al Ali B, Al Mousawi Z. The prevalence of dental caries among students of dentistry colleges in Holy Kerbala Governorate/ Iraq in 2017. *J Contemp Med Sci* 2019;5:154-9.
- Al-Derzi NA, Al-Dabbagh SA, Kassim HJ. Prevalence and risk factors of dental caries among secondary school students in Zakho, Kurdistan Region, Iraq. *Duhok Med J* 2015;9.
- Rm T, Ro I. Prevalence and distribution of dental caries experience according to GV black classification for patient attending to dental school. *J Oral Health Commun Dent* 2015;9:60-3.
- Shahzad Ali S, Sibra Tul M, Muhammad Bader M. Incidence of caries in 6-12 years children visiting Punjab Dental Hospital, Lahore and Sardar Begum dental college and hospital, Peshawar. *Pak Oral Dent J* 2008;28:117-22.
- Shakoor MM, Arslan Iqbal MN. Evaluation of the relationship between the prevalence of dental caries and age factor in dental patients. *Pakistan J Med Health Sci* 2017;11:381-3.
- Kidd EA, Fejerskov O. What constitutes dental caries? Histopathology of carious enamel and dentin related to the action of cariogenic biofilms. *J Dent Res* 2004;83:C35-8.
- Demirci M, Tuncer S, Yuceokur AA. Prevalence of caries on individual tooth surfaces and its distribution by age and gender in university clinic patients. *Eur J Dent* 2010;4:270-9.
- Kojima A, Ekuni D, Mizutani S, Furuta M, Irie K, Azuma T, et al. Relationships between self-rated oral health, subjective symptoms, oral health behavior and clinical conditions in Japanese university students: A cross-sectional survey at Okayama University. *BMC Oral Health* 2013;13:62.
- Kämppi A, Tanner T, Päckkilä J, Patinen P, Järvelin MR, Tjäderhane L, et al. Geographical distribution of dental caries prevalence and associated factors in young adults in Finland. *Caries Res* 2013;47:346-54.
- Lukacs JR, Largaespada LL. Explaining sex differences in dental caries prevalence: Saliva, hormones, and "life-history" etiologies. *Am J Hum Biol* 2006;18:540-55.
- Al-Sultani HFF. Prevalence and severity of dental caries, periodontal diseases and dental erosion among (20–40) years old pregnant women in Hilla city, Babylon governorate-Iraq. *Health* 2013;5:7.
- Azam S, Khurram MS, Hassan M, Iqbal F, Iqbal S. Distribution of dental caries and its relationship to risk factors. *Pak Oral Dent J* 2011;31:453-8.
- Kutesa A, Mwanika A, Wandera M. Pattern of dental caries in Mulago Dental School Clinic, Uganda. *Afr Health Sci* 2005;5:65-8.
- Lipsky MS, Su S, Crespo CJ, Hung M. Men and oral health: A review of sex and gender differences. *Am J Mens Health* 2021;15:15579883211016361.
- Furuta M, Ekuni D, Irie K, Azuma T, Tomofuji T, Ogura T, et al. Sex differences in gingivitis relate to interaction of oral health behaviors in young people. *J Periodontol* 2011;82:558-65.
- Olsson B, Segura-Bernal F, Tanda A. Dental caries in urban and rural areas in Mozambique. *Commun Dent Health* 1989;6:139-45.
- Huang S, Wu L. The prevalence of dental caries in urban areas is lower than that in rural areas—Analysis of changes in the epidemiological characteristics of caries in urban and rural areas. *J Prevent Treatment Stomatolog Diseases* 2020;12:273-8.
- Al-Rafee MA, Alshammery AR, Alrumikan AS, Pani SC. A comparison of dental caries in urban and rural children of the Riyadh Region of Saudi Arabia. *Front Public Health* 2019;7:195-195.