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Rapid Situation Assessment of Dental Caries and Its Risk Factors Among High School Students in Erbil City; A Cross-Sectional Study

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Abstract

Background and objectives: Dental caries are defined by the World Health Organization (WHO) as the destruction of the tooth's enamel caused by acids produced after bacteria fermentation the sweetie foods. Due to the steady maturation of teenage bodies and minds, puberty is a critical period of growth and change. The purpose of the study is to determine the incidence of dental caries and so its risk factors among high school students in Erbil. Methods: A cross-sectional study was done in Ten high schools from various parts of Erbil city that were randomly selected. Students from each school were enrolled using a randomized clustered sampling technique. Results: The study population was composed of 650 students, whose ages ranged from 14 to 20 years, with a mean and ±SD of 16.71±1.5 years; 298 (45.8%) of them were males and 352 (54.2%) were females. with a male-to-female ratio of 1:1.8. The study found that 72.31% of the study sample has dental caries, while 27.69% were free from caries. The caries was more among males 228 (76.5%) than females 242 (58.8%) with a statistically significant difference (P 0.028). Conclusions: The study concluded that in Erbil City, a large percentage of high school students have dental cavities. The associated risk factors for caries development were high in the male gender, low parental education, low family income, low teeth brushing, not using dental floss, and absence of interdental cleaning.

Keywords

dental caries, student, Erbil

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RESEARCH ARTICLE

Rapid Situation Assessment of Dental Caries and Its Risk Factors Among High School Students in Erbil City; A Cross-Sectional Study

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ABSTRACT

Background and objectives: Dental caries are defined by the World Health Organization (WHO) as the destruction of the tooth's enamel caused by acids produced after bacteria fermentation the sweetie foods. Due to the steady maturation of teenage bodies and minds, puberty is a critical period of growth and change. The purpose of the study is to determine the assessment of dental caries and so its risk factors among high school students in Erbil.
Methods: A cross-sectional study was selected for high school students from ten different schools from various parts of Erbil city. The students were enrolled using a randomized clustered sampling technique.
Results: The study population was composed of 650 students, ages ranged from 14 to 20 years, with a mean ±SD of 16.71±1.5 years; 298 (45.8%) of them were males and 352 (54.2%) were females. with a male-to-female ratio of 1:1.8. The study found that 72.31% of the study sample has dental caries, while 27.69% were free from dental caries. The caries was more among males 228 (76.5%) than females 242 (58.8%) with a statistically significant difference (P= 0.028).
Conclusions: The study concluded that in Erbil City, a large percentage of high school students have dental caries. The associated risk factors for caries development were high in the male gender, low parental education, low family income, low teeth brushing, not using dental floss, and absence of interdental cleaning.
Keywords: Assessment, Dental caries, Risk factors Students, Erbil.

INTRODUCTION

Dental caries is defined by the World Health Organization (WHO) as the destruction of the tooth's enamel caused by acids produced when bacteria react with carbohydrates (Shitie et al., 2021). Everybody has a lifetime risk of developing dental caries, which is a chronic condition that is widely recognized in individuals. The most prevalent oral health condition among children in school is dental caries, which is the most significant oral disease (Van Chuyen et al., 2021).

Due to the steady maturation of teenage bodies and minds, puberty is a critical period of development and change. In later years of life, permanent dentition begins working. Teenagers' lifestyle quality, pain reports, and absences from school may all be impacted by a high frequency of dental caries (Li et al., 2021).

In order to cause dental caries, dental caries often include many factors, including the host (teeth), the substrate (a diet high in sugar), bacteria, and time. The main cause of tooth cavitation is an acidic substance that is formed when bacteria and sugary foods combine. Streptococcus mutans, Lactobacillus, and other closely related bacteria including Veillonella species, Actinomyces spp, and Bifidobacterium spp. are the main bacteria that cause dental caries (Chugh et al., 2018).

It has been suggested that a factor influencing teens' health practices is the environment in which they live and develop. Dental caries prevalence is correlated with family socioeconomic status. Families with low socioeconomic status and education levels typically have less access to dental services and oral hygiene supplies and have less understanding about oral hygiene, which leads to a higher prevalence and more severe tooth decay (Al-Meedani and

Al-Dlaigan, 2016). Globally, it is estimated that about 3.5 billion people suffer from oral illness. 36% of people on the planet, or 2.4 billion people, have dental caries in their permanent teeth. Dental caries causes more than 530 million youngsters to lose their primary teeth each year (Shitie et al., 2021). One of the most extensively studied oral disorders, dental caries develops over time as a result of exposure to tooth-susceptible bacteria and a cariogenic diet in particular amounts. One of the most common diseases in adolescence is caries, which is regarded as a multifactorial condition that is locally contagious (Borges et al., 2016).

Ethiopia had a population-wide dental caries rate of 40.98%, Sudan had a rate of 52.4%, Kenya had a rate of 50.3%, and Tanzania had a rate of 40.2% (Teshome et al., 2021). 53.4% of children in Brazil seemed to have the condition of tooth decay, while 56.5% of teenagers had (Borges et al., 2016).

Teenagers who have dental caries experience difficulties with sleeping, playing, eating, acting in school, and communicating because of missing, discolored, or eroding teeth. Typically, it has an impact on their social, emotional, and physical development (Borges et al., 2016).

According to the best knowledge, there are no studies conducted in Erbil city, among high school students. Therefore, performing this study is highly necessary to have information about the frequency of dental caries in these age groups, and to be a database for planning better school health promotion and preventing dental caries or even decreasing the incidence of it among our population.

The purpose of this study was to determine the assessmentof dental caries and its association with potential risk factors among high school students in Erbil city.

SUBJECTS AND METHODS

A cross-sectional study was conducted in ten high schools chosen randomly from different areas of Erbil city, from each school the students enrolled in the study using a randomized clustered sampling method, the estimated sample size hang around 650 students according to the method (n=(Z^2 pq)/d^2) by Hajian-Tilaki (2014), in which n: sample size, Z: level of significant 1.96, p: prevalence of indicators (0.50 which gives the highest sample size, q: 1-p, d^2: degree of precision (0.05) .

The current research was carried out between 1st September 2021 and 1st September 2022; the data collection period was from 1st September 2021 to 1st March 2022.

The inclusion criteria included high school students (grades 10 to 12), of both genders. The data was collected using an interview questionnaire, which was written in English and designed by researchers. The questionnaire asks them about their sociodemographic details, including their age, sex, parents' educational background, and family income, also questions about their practice concerning dental caries and oral hygiene like teeth brushing, use of dental floss, type of toothpaste, etc.

The research topic and contents were authorized by the college's ethics committee. Optional participation in the study was explained to all participants and they had given their consent to take part. After being fully informed about the aim of the survey, they were ensured that responses will be kept private and solely utilized for study, and anonymity was made sure by omitting their names.

Statistical analysis:

Data analysis has been done by using Statistical Package for Social Sciences (IBM SPSS Software Version 26). The frequency and percentages of different variables were summarized using frequency Tables. The Chi-square test and Fisher's exact test of the association have been used to find out the association between different categorical variables. A P value of ≤ 0.05 was considered to be statistically significant.

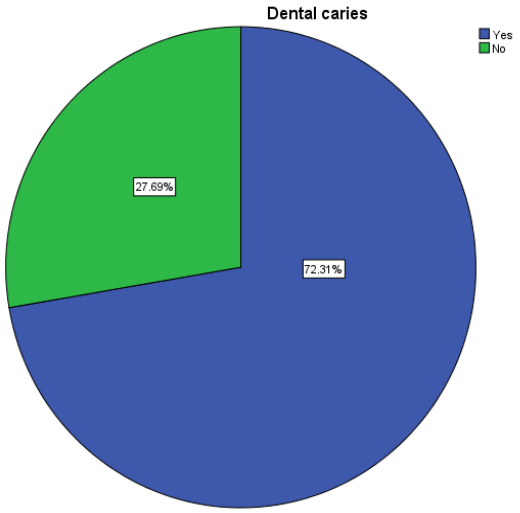
RESULTS

The study sample was composed of 650 students, 298 (45.8%) males and 352 (54.2%) females with a male to female ratio of 1:18, their ages ranging from 14 to 20 years, with a mean and ±SD of 16.71±1.5 years, from high schools grades 10, 11 and 12 (31.2%, 38.0%, and 30.8% respectively) as shown in Table1.

Table 1: Socio-demographic characters of the study sample

Characters	No.	%
Gender		
Male	298	45.8
Female	352	54.2
Grades		
10^{th}	203	31.2
11^{th}	247	38.0
12^{th}	200	30.8
Age		
14	38	5.8
15	93	14.3

16	194	29.8
17	136	20.9
18	110	16.9
19	42	6.5
20	37	5.7
Total	650	100



Graph 1: Dental caries among study sample

The study found that out of 650 students, 470 (72.31%) of them have dental caries, while 180 (27.69%) were free of caries as shown in Graph 1. higher education of parents the lower caries in their adolescent's mouth, moreover the higher income of the family the lower caries was found and these findings were statistically significant as shown in Table 2.

Table 2: Association of dental caries with different risk

Sociodemographic characters		Caries No. (%)	No caries No. (%)	Total No. (%)	P Value
	Gender				
Male		228 (76.5)	70 (23.5)	298(100)	0.028
Female		242 (58.8)	110 (31.2)	352 (100)	
Grades					
10th		150 (73.9)	53 (26.1)	203 (100)	0.009
11th		191 (77.3)	56 (22.7)	247 (100.0)	
12th		129 (64.5)	71 (35.5)	200 (100.0)	
Father education					
Illiterate		114 (80.9)	27 (19.1)	141(100.0)	0.040
Primary school		177 (70.5)	74 (29.5)	251(100.0)	
Secondary school		110 (72.4)	42 (27.6)	152(100.0)	
Higher education		69 (65.1)	37 (34.9)	106(100.0)	
Mother Education					
Illiterate		153 (84.5)	28 (15.5)	181(100.0)	0.000
Primary school		170 (67.7)	81 (32.3)	251(100.0)	
Secondary school		88 (68.2)	41 (31.8)	129(100.0)	
Higher education		59 (66.3)	30 (33.7)	89 (100.0)	
Family Income					

Insufficient		**34 (85.0)**	**6 (15.0)**	**40 (100.0)**	**0.026**
Sufficient		**376 (73.0)**	**139 (27.0)**	**515(100.0)**	
More than sufficient		**60 (63.2)**	**35 (36.8)**	**95 (100.0)**	
Total		**470 (72.31)**	**180 (27.69)**	**650 (100.0)**	

Table 3 shows that caries was less among those who brush their teeth than those not (70.4% vs 91% respectively) furthermore, this distinction was statistically significant (P= 0.001), also whenever brushing time was increasing from 1-2 minutes to 3 minutes the caries was decreasing with a statistically significant difference (P =0.001). Also, for those who were brushing their tongues caries were less in comparison to those not (64.8% vs 77.0%) with a statistically significant difference (P= 0.001). Moreover, the caries was statistically less in those using dental floss, mouthwash, and inter-dental place cleaning than those non-users (P= 0.000, 0.032, and 0.005, respectively).

According to the study, there was no statistically significant difference between the caries rate among those using fluorinated and non-fluorinated toothpaste (P= 0.124), while the caries was higher among gum chewing users than non-users with differences that are statistically significant (P= 0.000).

Table 3: Association of dental caries with oral hygiene practice

Oral hygiene Variables	**Caries No. (%)**	**No caries No. (%)**	**Total No. (%)**	**P Value**
Teeth brushing				
Yes	**417 (70.4)**	**175 (29.6)**	**592(100.0)**	**0.001**
No	**53 (91.4)**	**5 (8.6)**	**58 (100.0)**	
Brushing time				
1 min	**118 (78.1)**	**33 (21.9)**	**151(100.0)**	**0.001**
2 min	**159 (73.3)**	**58 (26.7)**	**217 (100.0)**	
3 min	**95 (79.2**	**25 (20.8**	**120 (100.0)**	
>3 min	**97 (60.2**	**64 (39.8**	**161(100.0)**	
Tongue cleaning				
Yes	**162 (64.8)**	**88 (35.2)**	**250 (100.0)**	**0.001**
No	**308 (77.0)**	**92(23.0)**	**400 (100.0)**	
Dental floss use				
Yes	**152(61.8)**	**94(38.2)**	**246(100.0)**	**0.000**
No	**318(78.7)**	**86(21.3)**	**404(100.0)**	
Mouthwash use				
Yes	**270(69.2)**	**120(30.8)**	**390(100.0)**	**0.032**
No	**200(76.9)**	**60 (23.1)**	**260(100.0)**	
Interdental cleaning				
Yes	**345(69.6)**	**151(30.4)**	**496 (100.0)**	**0.005**
No	**125(81.2)**	**29(18.8)**	**154(100.0)**	

Type of toothpaste				
Fluorinated	**39(62.9)**	**23(37.1)**	**62(100.0)**	**0.124**
Not fluorinated	**32(66.7)**	**16(33.3)**	**48(100.0)**	
I don't know	**399(73.9)**	**141(26.1)**	**540(100.0)**	
Gum Chewing				
Yes	**354(76.6)**	**108(23.4)**	**462(100.0)**	**0.000**
No	**116(61.7)**	**72(38.3)**	**188(100.0)**	
Total	**470 (72.31)**	**180 (27.69)**	**650 (100.0)**	
Total	**470 (72.31)**	**180 (27.69)**	**650 (100.0)**	

DISCUSSION

The current study_is the first study to ascertain the prevalence of dental caries among high school students and its related risk factors in Erbil city. The age range of the study sample was from 14 to 20 years old, with a mean ±SD of 16.71±1.5 years, when all permanent teeth are erupted, and all deciduous teeth are exfoliated.

The study found that 72.31% of them have dental caries and 27.69% caries free, which was found to be close to the dental caries prevalence in a research carried out in the United Kingdom in 2009, among 15-20 years adolescent school students, when 72% of them had obvious tooth decay (DDS et al., 2009).

Also, In 2010 research conducted in the United States, 78% of 17 years old students have dental caries in their oral cavity (Satcher, 2010). Also, the current finding was close to another study that was done in in Qazvin province in Iran, the results demonstrated that 73% of people aged 15 and 16 years old have dental caries (Hamissi et al., 2008).

Low socioeconomic status may have contributed to the increased frequency of caries, Dental caries rates among adolescents are impacted by poor oral hygiene practices and a cariogenic diet.

While in the study conducted among high school students between 15-18 years old in Zakho city in Iraq, the prevalence was much higher than in the present study, with 92.5% (Kassim et al., 2015). This may be due to difference and effect of mountain geographic area of Zaxo, where the fluoride level will be lower in the drinking water, in addition to that due general educational and socioeconomic difference between a suburban of Zaxo with a big Erbil city center.

In India, a highly thorough and comprehensive National Health Survey was conducted in 2004 over the whole nation to ascertain the incidence of dental illness and the condition of oral health in representative age groups. According to the data, dental caries affects 63.1% of 15-year-old adolescents (Miglani, 2020).

The high prevalence of caries may reflect the lack of basic epidemiological information and poor educational programs about dental caries among adolescents in Erbil city which played a role in the development of high numbers of caries. Since oral health is a component of overall health, it is integral part as it's the entry of digestive system, it can have an adverse effect on students' overall well-being and quality of life.

The current study found dental caries was more common among males than females; this may be due to cigarette and shisha smoking which is more common among males and maybe because of neglecting tooth brushing among males. In addition to that, the girls tend to have more commitment to healthy principles and behaviors both in terms of dental and overall wellness. In a research on attitudes about oral health, it was discovered that those with better and more consistent health views from adolescence to adulthood had fewer missing teeth, less periodontal disease, better dental hygiene, more restorations, and higher self-rated oral health (Branch-Elliman, 2012).

While in a study conducted in Hyderabad, India among children and teenagers, caries were more among females than males, and this may be contributed to cultural and oral hygiene practices and behavior differences in the study sample (Sukhabogi et al., 2014).

The current study, also found that the higher education of parents and sufficient income of family associated with the lower caries in their offspring, which agrees with a study done among Lithuanian children and teenagers where high education of parents lower caries rate was recorded reflecting the role of parents in advising their offspring about healthy oral hygiene, and a proper income gives more chance to dentist visits and using good quality

toothbrushes and toothpaste (Saldūnaitė et al., 2014).

The dental disease varies dramatically depending on income level. Children from low-income families' experience twice as much dental caries and a higher likelihood of untreated illness. These inequalities between the wealthy and the poor persist through adolescence (Satcher, 2010).

The current study found that caries was less among those who brushed their teeth than those not (70.4% vs 91% respectively), which agreed with the study conducted by Anagnostopoulos and his colleagues found that those brushing their teeth regularly were with less dental caries (Anagnostopoulos et al., 2011). Moreover, the caries was statistically less in those using dental floss, there may be a reduction in caries when flossing is carried out by

trained individuals properly and consistently (Fejerskov and Kidd, 2008).

The current study found that caries was less among those regularly using mouthwash and inter-dental place cleaning than those non-users. There is good proof that professionally applied dentifrices and mouthwashes containing fluoride are active in preventing dental caries among high-risk patients (Parker and Parker, 2004a).

The study discovered no statistically significant difference between those using fluorinated and non-fluorinated toothpaste in terms of caries rates, this may be because the study sample was not able to differentiate between the two types of pastes because, in fact, fluoride is widely recognized for decreasing the prevalence of tooth decay (Parker and Parker, 2004b).

While caries was higher among gum chewing users than non-users with a statistically significant difference, Fejerskov and Kidd (2008) found that among gum users interrupted before open cavitation happened, however, it unmistakably demonstrated the impact of repeated sugar intake on the development of caries. After the sucrose rinses were stopped, white areas were shown to be reversed. Children aged 7 to 11 years old chewing gum sweetened with 60% sucrose and 20% glucose twice daily for two years has been compared to not chewing gum. In the group receiving sugared gum, a statistically significant greater caries increase was noted. (Fejerskov and Kidd, 2008).

teeth than those not (70.4% vs 91% respectively) furthermore, this distinction was statistically significant (P= 0.001), also whenever brushing time was increasing from 1-2 minutes to 3 minutes the caries was decreasing with a statistically significant difference (P =0.001). Also, for those who were brushing their tongues caries were less in comparison to those not (64.8% vs 77.0%) with a statistically significant difference (P= 0.001). Moreover, the caries was statistically less in those using dental floss, mouthwash, and inter-dental place cleaning than those non-users (P= 0.000, 0.032, and 0.005, respectively).

According to the study, there was no statistically significant difference between the caries rate among those using fluorinated and non-fluorinated toothpaste (P= 0.124), while the caries was higher among gum chewing users than non-users with

CONCLUSION

- The frequency of dental caries among high school students in Erbil city was high.
- The result revealed that dental caries is more common in males than that of females.
- The higher education of parents with sufficient family income showed less dental caries.
- Rinsing and mouth washing using make less dental caries either with tape water or by medical mouth wash are better prognosis for preventing tooth decay.
- Regular teeth brushing and doing mechanical tooth cleaning shows less cavity in the mouth.
- The study concluded that the daily teeth brushing, brushing time for more than 3 minutes, use of dental floss, and avoidance of gum chewing will prevent significantly dental caries, in spite of existing of other risk factors.

REFERENCES

Al-Meedani, L.A., Al-Dlaigan, Y.H., 2016. Prevalence of dental caries and associated social risk factors among preschool children in Riyadh, Saudi Arabia. Pak. J. Med. Sci. 32, 452–456.

Anagnostopoulos, F., Buchanan, H., Frousiounioti, S., Niakas, D., Potamianos, G., 2011. Self-efficacy and Oral Hygiene Beliefs about Toothbrushing in Dental Patients: A Model-guided Study. Behav. Med. 37, 132–139.

Borges, T.S., Schwanke, N.L., Reuter, C.P., Neto, L.K., Burgos, M.S., 2016. Factors associated with caries: a survey of students from southern Brazil. Rev. Paul. Pediatr. 34, 489–494.

Branch-Elliman, D., 2012. A Gender-Based Approach to Oral Health Changes Across the Lifespan 59.

DDS, Bagramian, M.R.A., Garcia-Godoy, P.F., Volpe, M.A.R., 2009. Perspective and Call for Action The global increase in dental caries. A pending public health crisis.

Fejerskov, O., Kidd, E.A.M. (Eds.), 2008. Dental caries: the disease and its clinical management, 2nd ed. ed. Blackwell Munksgaard, Oxford ; Ames, Iowa.

Hajian-Tilaki, K., 2014. Sample size estimation in diagnostic test studies of biomedical informatics. J. Biomed. Inform. 48, 193–204.

Hamissi, J., Ramezani, G.H., Ghodousi, A., 2008. Prevalence of dental caries among high school attendees in Qazvin, Iran. J. Indian Soc. Pedod. Prev. Dent. 26, 53.

K Chugh, V., K Sahu, K., Chugh, A., 2018. Prevalence and Risk Factors for Dental Caries among Preschool Children: A Cross-sectional Study in Eastern India. Int. J. Clin. Pediatr. Dent. 11, 238–243.

Kassim, H.J., Al-Dabbagh, S.A., Phil, D., Derzi, N.A.A.-, 2015. Prevalence And Risk Factors Of Dental Caries Among Secondary School Students In Zakho, Kurdistan Region, Iraq 9, 11.

Li, J., Zhang, K., Lu, Z., 2021. Prevalence and factors contributing to dental caries in 12–15-year-old school adolescents in northeast China. BMJ Open 11, e044758.

Miglani, S., 2020. Burden of Dental Caries in India: Current Scenario and Future Strategies. Int. J. Clin. Pediatr. Dent. 13, 155–159.

Parker, P.M., Parker, J.N., 2004a. Dental caries: a medical dictionary, bibliography, and annotated research guide to Internet references. ICON Health Publications, San Diego, CA.

Parker, P.M., Parker, J.N., 2004b. Dental caries: a medical dictionary, bibliography, and annotated research guide to Internet references. ICON Health Publications, San Diego, CA.

Saldūnaitė, K., Bendoraitienė, E.A., Slabšinskienė, E., Vasiliauskienė, I., Andruškevičienė, V., Zūbienė, J., 2014. The role of parental education and socioeconomic status in dental caries prevention among Lithuanian children. Medicina (Mex.) 50, 156–161.

Satcher, D., 2010. Oral Health in America: A Report of the Surgeon General.

Shitie, A., Addis, R., Tilahun, A., Negash, W., 2021. Prevalence of Dental Caries and Its Associated Factors among Primary School Children in Ethiopia. Int. J. Dent. 2021, a6, 66-96.

Sukhabogi, J., Parthasarathi, P., Anjum, S., Shekar, B., Padma, C., Rani, A., 2014. Dental Fluorosis and Dental Caries Prevalence among 12 and 15-Year-Old School Children in Nalgonda District, Andhra Pradesh, India. Ann. Med. Health Sci. Res. 4, S245–S252.

Teshome, A., Muche, A., Girma, B., 2021. Prevalence of Dental Caries and Associated Factors in East Africa, 2000–2020: Systematic Review and Meta-Analysis. Front. Public Health, 9, 9-1.

Van Chuyen, N., Van Du, V., Van Ba, N., Long, D.D., Son, H.A., 2021. The prevalence of dental caries and associated factors among secondary school children in rural highland Vietnam. BMC Oral Health 21, 1–7.