

# Assessment of caries diagnostic threshold of DMFT, and ICDAS II in the estimation of caries prevalence rate in first permanent molars among students of College of Dentistry, Hawler Medical University.

Razawa Kareem Saeed<sup>(1)</sup>; Mustafa Isa Omer<sup>(2)</sup>; Neenor Nazar Hanna<sup>(2)</sup>; Hallo Khals Ghafour<sup>(2)</sup>

**Background:** Dental caries is a common chronic infectious disease resulting from tooth-adherent cariogenic bacteria primarily *S. Mutans*, which metabolize sugars to produce acid, demineralizing the tooth structure over time.

First permanent molars (FPMs) have a key role in establishing dental occlusion. They are very prone to caries because of their anatomical structure and early eruption. Hence, the estimation of dental caries in FPMs at individual and community levels could help understand the pattern and severity of dental caries.

**Aim:** The current study aimed to evaluate the caries prevalence of FPMs amongst the students of collage of dentistry/HMU. The rate of decay between male and female, maxillary and mandibular FPM teeth.

**Method:** This study was carried out among the students of Hawler medical university/college of dentistry. The total number of samples was (100) samples. The age of the students ranged from (18-24 years) of age. Clinical examinations were carried out under artificial light using dental mirrors and dental probe/explorers. Dental caries was diagnosed on teeth number (3, 14, 19, and 30), according to the criteria of DMFT index looking for missing, filling, decayed teeth. then ICDAS to further classify the amount of dental caries later the collected data was analyzed by using SPSS

**Results:** in this study the difference in decay between maxillary and mandibular teeth was significant with the P value being (0.27). Between genders the P value was (0.38) and between age groups was (0.30) their result being insignificant, according to chi-square test.

**Conclusion:** this study indicates that; the rate of decay is more in mandibular FPMs in comparison to maxillary FPMs. While the difference between the male, female and different age group in caries prevalence are non-significant, hence, more education about the aforementioned problems is necessary. **Keywords:** Caries Diagnostic Threshold, Prevalence Rate.

---

<sup>(1)</sup> Department of Conservative Dentistry, College of Dentistry, Hawler Medical University.

<sup>(2)</sup> Undergraduate student at the College of Dentistry, Hawler Medical University.

**Correspondent Name:** Razawa Kareem Saeed Email: razawakareem@yahoo.com

## INTRODUCTION

Worldwide, untreated caries disease is the most prevalent chronic pathology, even in deciduous teeth it is the tenth most prevalent. This evidence demonstrates the importance of knowing its pathophysiology, along with establishing public health policies, methods of detection, diagnosis and appropriate treatment to achieve control. It is considered a public health problem due to its prevalence, high cost of treatment and because it affects people's quality of life.<sup>2</sup> First permanent molars (FPMs) have a key

role in establishing dental occlusion. They are very prone to caries because of their anatomical structure and early eruption. Hence, the estimation of dental caries in FPMs at individual and community levels could help understand the pattern and severity of dental caries. Dental caries is detected using a variety of indices with different diagnostic thresholds.<sup>3,4</sup>

The most common epidemiologic scale for caries detection is DMF which was first introduced in 1930s. In this scale decayed (D), missed (M) and filled (F) teeth are evaluated

and reported according to the number of teeth (DMFT) or surfaces (DMFS) involved. Therefore, DMF is not an appropriate criterion for caries prevalence because it overestimates active carious lesions.<sup>10</sup>

A novel system referred to as International Caries Detection and Assessment System (ICDAS) was founded by investigators of cariology. Diagnosis of caries and dental condition with this system leads to improved quality of diagnosis, prognosis, and clinical treatment. This system is accurate and reproducible and is very helpful in the diagnosis of early carious lesions as well as long-term evaluations.<sup>5</sup> The system is based upon visual examination of the teeth in a clean dry and accurate environment. Therefore, there is an increased chance of detecting incipient carious lesions. In this system, dental conditions (i.e., intact, restored, impacted, extracted, etc.) are classified into scores from 0 through 9. In order to evaluate the carious state of the teeth, scores from zero through 6 are taken into consideration from the earliest state of decalcification to advanced cavitated lesions. In ICDAS system coronal carious lesions (in pits and fissures, mesial-distal, and buccolingual areas) root caries and lesions accompanied by restorations and sealants have different codes. Advantages of this system are as follows: condition of the tooth and the stages of caries process is easily detectable by the investigators and clinicians and on the other hand it is easy to understand the severity and activity state of the lesion. Also, there is a possibility to compare different studies from different parts of the world with an increased accuracy.<sup>1,7</sup>

The current study aimed to estimate the diagnostic potential of two caries detection tools, namely, DMFT, ICDAS, to evaluate the caries prevalence of FPMs amongst the students of collage of dentistry/HMU. The rate of decay between (male, female) and (maxillary, mandibular) in the FPMs, and a more detailed report on the prevalence of pre-cavitated and cavitated caries lesions. The findings of this study could help oral health care professionals and policymakers to choose diagnostic criteria for estimating caries prevalence and disease burden,

which could aid in the development of dental caries prevention strategies at the individual and community levels.

## Materials and methods

**Sample collection.** This study was carried out amongst the students of hawler medical university/collage of dentistry. A randomized sampling method was used. The total number of samples was (100) samples, amongst all five stages of the collage. The age of the students ranging from (18-24 years) of age. And participants were all willingly wanted to be part of the study. The study protocol was approved by the committee of the collage in an ethical stand point.

**Case sheet.** Case sheet used to record the information of the participants, in an A4 paper. The case sheets consist of personal information in the means of (name, age and address). Second part is the diagnosis part which is divided into 4 parts specified for the teeth number (3, 14, 19 and 30) which helped in diagnosis of each of DMFT and ICDAS indices respectively. A sample of the case sheet present in.

**Caries examination.** Clinical examinations were carried out under normal dental chair light using dental mirrors and dental probe/explorers. Dental caries was diagnosed on teeth number (3, 14, 19, and 30), according to the criteria of DMFT index looking for missing, filling, decayed teeth. then ICDAS to further classify the amount of dental caries invading the decayed teeth. Examiners dried the tooth surfaces with cotton rolls and dental triple syringe and the participants were in semi-supine position on the dental chair. No radiographic examinations were done. After the examinations, the examiners reported and encouraged the participants to treat the missing, decayed or present of faulty restorations if present.

**Data analysis.** The data accumulated from the participants was analyzed by the aid of IBM SPSS statistics V.22 descriptive statistics with help of Microsoft excel 2010.

## RESULTS

The collected data were analyzed by using descriptive statistics and bar chart, the result

showed that the mean age of participants was 21 years of age as shown in Table.1

**Table1: The mean age of participants.**

Descriptive statistics					
	N	Minimum	Maximum	Mean	Standard Deviation
Age	100	18	24	21.11	1.36252

The result calculated for decay according to Upper and Lower (Pearson Chi-square) the (P value) was (0.027), and the fisher’s exact test was (0.030). as shown in Table.2.

**Table 2: P value and Fisher exact for decay according to Upper and Lower.**

	Asymp. Sig. (2-sided)	Exact Sig (2-sided)
Pearson Chi-square	0.027	0.030
Fisher’s Exact Test		0.030

The result calculated for decay according to gender (Pearson Chi-square) the (P value) was (0.383), and the fisher’s exact test was (0.513). As shown in Table.3.

**Table 3: P value and Fisher exact for decay according to gender.**

	Asymp. Sig. (2-sided)	Exact Sig (2-sided)
Pearson Chi-square	0.383	0.513
Fisher’s Exact Test		0.513

The result calculated for filling according to Gender (Pearson Chi-square) the (P value) was (0.89), and the fisher’s exact test was (0.99). as shown in Table.4.

**Table 4: P value and Fisher exact for filling according to gender.**

	Asymp. Sig. (2-sided)	Exact Sig (2-sided)
Pearson Chi-square	0.089	0.099
Fisher’s Exact Test		0.099

The mean ICDAS for tooth number #3 is (0.5152). The mean ICDAS for tooth number #14 is (0.4343). The mean ICDAS for tooth number #19 is (0.5204). The mean ICDAS for tooth number #30 is (0.5510)., as shown in Table.5. below.

**Table 5: the mean ICDAS for Teeth Number #3,14,19,30**

Descriptive statistics					
Tooth number	N	Minimum	Maximum	Mean	Standard Deviation
#3	99	0.00	3.00	.5152	.69051
#14	99	0.00	3.00	.4343	.75811
#19	98	0.00	3.00	.5204	.74929
#30	98	0.00	3.00	.5510	.76148

## DISCUSSION

In this study we focused on the FPMs in mandibular and maxillary, right and left side in order to see the defect in each tooth and find out the reason behind it. In addition to DMFT we used ICDAS in order to detect the severity of decay in each tooth. Peak participation age was between (18-24) years of age, the mean age of participants was 21 years. The P value according to chi-square test between male and female in caries prevalence was (0.302) and the fishers exact test was (0.329) which is insignificant according to both analysis, which can be due to inconsistent data collection between the age groups or may be due to small sample size. We found out that the P value according to chi-square test regarding decay in maxillary arch (in both genders) related to mandibular arch, was (0.027), the fishers exact test was (0.030) and that is significant according both tests. This can be due to different positions and anatomical structures, early eruption of lower FPM, deep pits and fissures of the occlusal surface, relatively poor degree of mineralization and difficulty to clean.

We examined both (50) males and (50) females, in order to keep the data equal between them, and see which gender is more susceptible to defect. We noticed that tooth decay in males was more than females, that can be due to that males are more ignorant to their oral hygiene, smoke more and drink too much beverages. The result was insignificant according to chi-square test P value was (0.383) and fishers exact test was (0.513). The result was inconsistent with the study done in HMU (Hawler Medical University), they found that the rate of decay was higher in females,<sup>8</sup> it is also inconsistent with the study done in Vietnam,

they reported that there is no difference in the prevalence of decay between genders.<sup>9</sup> The rate of filling in both arches in females was more than males. We found that females are more protective for their teeth in comparison to males, which is consistent with the study done in 2023, in which they stated that girls have higher rate of tooth brushing and dental Restorations.<sup>6</sup> Regarding chi-square test the P value was (0.089) and the fishers exact test was (0.099). The result was close to significant but because of limited number of participants the result turned out insignificant.

About the ICDAS according to severity of the decay in each tooth, we noticed that the minimum recorded ICDAS was code 0 (sound tooth), maximum code 3 (localized enamel break down after drying). the result is consistent with the study done in Costa Rica, they stated that caries rate according ICDAS in majority of cases were between code 1 and code 2.<sup>11</sup>

## CONCLUSION

The rate of decay was higher than we expected amongst dental students taking into consideration that they should have more knowledge about oral hygiene and protective measures. The proportion of decay was higher in the mandibular arch in comparison to the maxillary arch. There was no difference between the two genders. Also, no difference between the different age groups.

## REFERENCES

1. Banting D, Eggertsson H, Ekstrand K, FerreiraZandoná A, Ismail AI, Longbottom C, et al. Rationale and evidence for the international Caries Detection and Assessment System (ICDAS II). Proceedings of the 7th Indiana Conference; 2005 Sep; Indiana, USA. pp. 161-221.
2. Bhoopathi PH, Patil PU, Kamath BV, Gopal D, Kumar S, Kulkarni G. Caries detection with ICDAS and the WHO criteria: a comparative study. *J Clin Diagn Res.* 2017;11(12):9-12. doi:
3. Da Silva RP, Assaf AV, Mialhe FL, Mendes KLC, Meneghim M de C, Pereira AC. Dental caries diagnostic thresholds: which one? Why? When? *Int J Public Health.* 2020;65:371–4.
4. Fisher J, Click M. A new model for caries classification and management: the FDI World Dental Federation Caries Matrix. *J Am Dent Assoc.* 2012;143:546–51.
5. Fontana M, Zero DT, Beltrán-Aguilar ED, Gray SK. Techniques for assessing tooth surfaces in school-based sealant programs. *J Am Dent Assoc.* 2010;141(7):854-60.
6. Gelengul Urvasizoglu, Aybike Bas , Fatma Sarac, Peris Celikel, Fatih Sengul and Sera Derelioglu (2023). Assessment of Permanent First Molars in Children Aged 7 to 10 Years Old. *MDPI* ; p 5
7. Ismail AI. Visual and visuo-tactile detection of dental caries. *J Dent Res* 2004;83 Spec No C:C56-66.
8. Mahmood F. Abdul-jabbar, Blend H. Mohammad, Mansour H. Mohammad (2021). Prevalence of dental caries among different stage students in College of Dentistry, Hawler Medical University. *Erbil Dental Journal* vil.4 no.2; p 157-158
9. Nguyen van chuyen, Vu Van Du, Nguyen Van Ba, Dao Duc Long, Ho Anh Son (2021). The prevalence of dental caries and associated factors among secondary school children in rural highland Vietnam. *BMC Oral Health* 21:349; p 5 of 7
10. Roberson TM, Heymann H, Edward J. Swift. *Sturdevant's art and science of operative dentistry.* 4th ed. London; John schrefer; 2006, 108-112.
11. Sylvia Gudiño-Fernández, Adrián Gómez-Fernández, Katherine Molina-Chaves, Juan Barahona-Cubillo, Romain Fantin, Cristina Barboza-Solís (2021). Prevalence of Dental Caries Among Costa Rican Male Students Aged 12-22 Years Using ICDAS-II. *Odovtos International Journal of Dental Sciences*, vol. 23, no. 2, pp. 181-195, 2021