Research Paper

Comparison of caries experience between WHO dentition status and ICDAS II criteria among 12 years old school children of Nellore district, Andhra Pradesh- A Cross Sectional study.

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ABSTRACT: *Dental caries has traditionally been assessed using the criteria established by the World Health Organization (WHO) in 1997, which include only obvious carious lesions. Whereas, International Caries Detection and Assessment System (ICDAS) is a valuable method for detecting the enamel caries lesions which helps in planning the individual remineralization therapy or for monitoring the caries pattern at the population level.*
Aims: To assess the prevalence of dental caries using International caries detection and assessment system-II and compare it with the caries prevalence assessed using Standard WHO criteria among school children aged 12years in the rural areas of Nellore district, Andhra Pradesh.
Settings and Design: This is a descriptive, cross-sectional study.
Methods and Material: Two methods were used to measure caries in 12 years old children of Nellore district. We compared the frequencies obtained by each method using the following indicators: the mean number of missing, filled and decayed teeth; and the disease extent. Each student was examined by a single examiner using ICDAS II and WHO system under natural light during normal school hours.
Statistical analysis used: The data were evaluated using Chi- square.
Results: Out of 380 individuals examined, 149 were male and 231 were female. According to ICDAS II index 100% males and 95.2% females were considered having caries and according to WHO 44.2% male and 48.9% females were considered having caries.
Conclusions: Caries prevalence was greater according to ICDAS II compared to WHO. The Distribution of non cavitated lesions were higher in studied population.
KEYWORDS: Early diagnosis, dental caries, prevalence.

I. INTRODUCTION

Traditionally, the WHO criteria (1997), which include only obvious carious lesions, have been used to assess dental caries. However, the detection of lesions in the early non-cavitated stage is important to the diagnostic process[1] so, ICDAS was developed for detecting. Managing enamel carious lesions through preventive and promotional activities, at the childhood stage, would be economically advantageous because these lesions would not demand complex treatments and more people would be educated in maintaining their teeth into adulthood[2]. The objectives are to assess the caries prevalence in 12 year old school children of Nellore district using ICDAS II as diagnostic criteria and compare the WHO criteria to the ICDAS II among study population.

II. SUBJECTS AND METHODS

A cross sectional study designed to determine the prevalence of dental caries of 12 years school children in Nellore district, Andhra Pradesh. The ethical approval for the study was obtained from the ethics committee of Narayana Dental College & Hospital, Nellore, Andhra Pradesh with number -NDC/. Permission to conduct the study was obtained from the school authorities and from the head teachers of the schools involved. Signed informed consent to examine the children was also obtained from the parents of the children. Examination of the subjects was done in rural government school of Nellore. Study population was only 12 year old rural school children of Nellore district, Andhra Pradesh. Duration of the study is of 3 months. Subjects will be selected from the government school of Nellore who will satisfy the inclusion criteria and were willing to participate and give written informed consent were included in this study. Inclusion Criteria: 1) Individuals aged 12 years. 2) Systemically healthy individuals. 3) Patient who will be willing to participate in the study with written informed consent. Exclusion Criteria: 1) Subjects with the presence of orthodontic appliances. 2) Subjects with more than 6 missing teeth. Sample size was estimated based on prevalence of dental caries reported in previous study conducted by Punitha V et al.[3] using the formulae: $n = 4.p.q / L2$

Where, n = sample size

p = Prevalence (36.7)

q = 1- p (100-36.7=63.3)

L = allowable error

So, final sample size was 371 which rounded to 380.

Multi stage cluster sampling methodology was used. Nellore District was divided into 5 divisions. Each division again divided into Mandals. Among all the Mandals, 10 Mandals was selected; one school was randomly selected from each Mandal. Here each school was considered as a cluster. Complete clinical oral examination of subjects was performed by using ADA type III examination with no.5 plain mouth mirror and a WHO periodontal probe, both sterilized. Clinical assessment was done using WHO criteria and ICDAS II criteria in all the 12 years old rural school children of Nellore district by single examiner.

Before the beginning of the study, the examiner underwent training by the assessment of photographs and clinical examinations. Assessment of reproducibility before and during the survey was conducted through repeated examinations on 5% of the sample. The minimal time interval between examinations was 4 hours. The intra examiner agreement was 0.85 Cohen's kappa for WHO criteria and ICDAS II.

Statistical analysis: Statistical analysis was performed using statistical tests and SPSS software program. Caries prevalence, according to the WHO criteria and ICDAS II criteria will be compared using Chi square test.

III. RESULTS

This study was conducted among 380 12 years old school children.

Table 1 shows demographic distribution of study population, which includes 39.2% males and 60.8% females out of 380 participants.

Table 2 shows gender wise distribution of dental caries as per WHO and ICDAS II criteria, this table explains that there is no statistical significant difference among males and females' caries distribution as per WHO criteria but there is statistical significant difference as per ICDAS II criteria among males and females.

Table 3 shows prevalence of dental caries according to WHO and ICDAS II criteria among study population. Prevalence of caries was 364 (95.7%) and 181 (47.6%) according to ICDAS II and WHO respectively. Absence of caries was seen among 16 (4.2%) and 199 (52.3%) subjects according to ICDAS II and WHO respectively. The difference among the criteria was statistically significant (p value <0.0001).

Table 4 explains the prevalence of dental caries according to ICDAS II codes, out of total number of teeth examined 10640, majority of teeth examined (75.9%) were scored as code 00(sound teeth), followed by 7.1% as code 01(first visual change in enamel) and code 06 (extensive distinct cavity with visible dentine) is scored least 0.3%.

Table 5 summarizes that, The caries prevalence and the mean decayed teeth of the WHO system correlated well with the score 4 cut-off of the ICDAS II, indicating that the equivalency point between these systems is at score 4 of the ICDAS II but there is statistically significant difference.

Table 1: Demographic table

Sl.no	Gender	n(%)
1	Males	149 (39.2)
2	Females	231 (60.8)
	Total sample	380 (100)

Table 2: Gender wise distribution of caries in WHO and ICDAS II

Sl.no	Gender	Presence of caries	
		WHO n(%)	ICDAS n(%)
1	Males (n=149)	66 (44.2)	149 (100)
2	Females (n=231)	113 (48.9)	220 (95.2)
	Total n=380	p value = 0.400 x^2 value = >0.05(NS)	p value =0.004 x^2 value = <0.05*

Chi square test, p value <0.05* significant; NS=Not significant

Table: 3– Comparison of dental caries prevalence according to WHO and ICDAS II.

sl.no		Caries free n	With caries n (%)	x^2 value	P value
1	ICDAS II	16	364 (95.7)	217.21	<0.0001**
2	WHO	199	181 (47.6)		

Chi-square test, p value <0.05* significant; NS=Not significant

Table: 4 – Prevalence of dental caries according to International caries detection and assessment system II codes.

Sl.no	ICDAS II codes	Teeth effected n (%)
1	00	8080 (75.9)
2	01	755(7.1)
3	02	584(5.5)
4	03	357(3.5)
5	04	143(1.3)
6	05	147(1.4)
7	06	31(0.3)
8	40	4(0.03)
9	60	1(0.0)
10	97	7(0.06)
11	99	531 (4.9)
	Total number of teeth examined	10640

Table 5: Comparison of caries prevalence obtained with ICDAS II using score 1, score 2, score 3 and score 4 as cut-off and WHO criteria.

Sl.no		Number of teeth decayed WHO	ICDAS cutoff score			
			1	2	3	4
1	DMFT value	451	2017	1262	678	321
	p value		<0.0001**	<0.0001**	<0.0001**	<0.0001**

Chi square test, *p<0.05 statistically significant

IV. DISCUSSION

The declining occurrence of caries in several populations has raised concerns about the appropriateness of the original WHO criteria because it focuses on the detection of cavitated lesions and restored/lost teeth.[4,5] According to the literature, the WHO is simple to apply, and analysis of its results is straightforward and as

widely discussed in the literature, caries detection at the cavity level may underestimate caries prevalence in populations. The inclusion of non-cavitated lesions improves caries detection.[4] Active non-cavitated caries lesions should be carefully evaluated during caries examination because intervention is needed to arrest disease progression.[4] The inclusion of non-cavitated lesions had the greatest impact on caries estimates among schoolchildren as observed in several studies. Early detection of incipient caries is one of the important steps in modern dentistry to create awareness among the community.[6] ICDAS was developed to fulfill the need for a reliable system for the detection of early stages of carious lesions to bring the focus back on prevention. Subsequently, the validity and reliability of this instrument had been proved in a number of studies.[7,8,9,10]

The Kappa index obtained in this study was very good, indicating high level of intra-examiner agreement (0.85). That confirms the statement that says ICDAS has good-to-excellent reproducibility, even for raters without experience in epidemiological studies and even after a short training time.[11,8]

In a study by Braga et al.[12] using the DMF and ICDAS on the same group of 252 children, ICDAS took twice as long to use in deciduous teeth, and the data generated using this method for cavitated dentine caries lesions were comparable to those of the DMF. According to the literature, the most complex method to use is ICDAS because its two-digit system uses the first digit to indicate fillings and sealants and the second for the detection of caries lesions. Additionally, enamel lesions are classified according to three different levels. During the examinations, it was necessary to classify each surface in relation to these two digits and to observe each surface before and after drying the tooth. The disadvantages of ICDAS have been reported by de Amorim et al.[1] and Iranzo-Cortes et al.[13] as also verified in the present study. The application of air to dry surfaces made the method time-consuming. As reported in ICDAS II manual,[14] the use of compressed air is essential for detecting caries codes 1 and 3, whereas caries codes 2, 4, 5, and 6 can be assessed if the tooth is viewed while wet.[15] Thus, in this study, chip blower was used to dry the tooth structure similar to the study conducted by Shankar et al.[6,7,16]

The data collected using ICDAS should be analysed carefully to determine its comparability with the WHO caries detection criteria. In this study, we converted the two-digit system into the one-digit system and used the DMF index to accommodate the combination scores similar to the study conducted by R G de Amorim.[1] In this study, score 4 of the ICDAS has been the point where these two systems match. Discussing the contentious issue of the equivalency point between these systems, score 4 of the ICDAS was seen to be matching with the WHO scores in this study whereas other studies carried out by Mendes FM et al.[17], Braga MM et al.[12], and Iranzo- cortes JE et al.[13], have found the equivalency point at three. The equivalency point obtained in this study is consistent with the one that is recommended by the ICDAS coordinating committee.[15]

In this study, the use of the ICDAS II unearthed a significant amount of non cavitated lesions in comparison with the WHO caries detection methods and is evident at the subject level of the study. 95.7% of the subjects were caries positive with the ICDAS II in contrast to 47.6% of the subjects with the WHO system and this difference was statistically significant (table 3). Similar results are seen in studies conducted by Iranzo-cortes JE et al.[13], and Braga MM et al.[12] In this study, only one subject had porcelain, gold, PFM crown or veneer restoration (code 60) and there were only four children (0.03%) with Amalgam restoration (code 40) which was detected by Caries Associated with Restoration and Sealants (CARS) detection criteria.

ICDAS II appeared as a flexible and easy index, but of delicate use[11]. ICDAS II offers a new perspective of the disease from the initial and precavitation stages, pointing to the need for a new treatment protocol aimed at prevention. One of its positive characteristics is flexibility, which allows to be easily adjusted to dmf or DMFT indexes, without affecting its integrity. It should be noted that, this study considered cavitated surfaces classified as codes 4, 5 or 6 of ICDAS II, as code 4 as cutoff point provides data that can be compared to the WHO criterion (table-5).

Limitation, due to small sample size and cross sectional design of the study generalizability is limited. The recommendations to decrease the prevalence of dental caries should be directed towards improvement of brushing habits, diet modification and dental health education programs at school level. Students affected by caries should undergo a periodic follow up for treatment and maintenance.

V. CONCLUSION

This study concludes, a high prevalence of dental caries with enamel carious lesions being the most frequent condition detected, showing that using icdas ii can lead to overvaluation of the seriousness of dental caries experience. Extractions due to caries, restorations were seldom found, indicating the lack of access to oral health care services among school children in nellore district, india.

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