RESEARCH ARTICLE

ASSOCIATION OF DENTAL CARIES PREVALENCE AND ORAL HYGIENE INDICATORS AMONG 12 AND 15 YEARS SCHOOL CHILDREN OF MURADNAGAR USING ICDAS II

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ABSTRACT

Introduction: Oral health is essential for general health and well-being throughout life and is a marker for overall health status. It is associated with the development of healthy personality and perception that enables an individual to speak, eat and socialize without active disease, discomfort or embarrassment.
Aim: To determine association of dental caries prevalence and oral hygiene indicators among 12 and 15 years old school going children using ICDAS II.
Material and methods: The data was recorded by investigator in pre-designed proforma. The proforma was divided into 2 parts. First part covers general information that comprise of demographic variables and socio-economic status to be filled by parents/guardians/caregivers. Second part comprised of questions regarding oral hygiene practices, dental behavioural indicators such as past dental care received to be filled by examiner through structured interview method . Plaque level was assessed by Patient Hygiene Performance (PHP) index.
Result: The results of the present study showed that most of students 11.2% 12 years old were affected by non-cavitated surface with underlying dark shadow from dentin, followed by distinct cavity with visible dentin 10.8%, extensive distinct cavity 7%. Among 15 years most of students were affected by 11.2% distinct cavity with visible dentin, followed by 10% non-cavitated surface with underlying dark shadow from dentin, extensive distinct cavity 4.6%.
Conclusion: It was concluded that Dental caries showed significant association with age, gender, level of education, occupation, frequency of tooth cleaning, frequency of changing toothbrush, time of tooth cleaning, tongue cleaning, past dental visit, duration of dental visit and dental care received during dental visit and also that the ICDAS II showed significant association with PHP index.

INTRODUCTION

Oral health is essential for general health and well being throughout life and is a marker for overall health status. It is associated with the development of healthy personality and perception that enables an individual to speak, eat and socialize without active disease, discomfort or embarrassment. Despite the great improvement in oral health, many countries still encounter oral diseases among which dental caries and

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periodontal diseases are most common oral diseases in children throughout the world. (Pitts *et al*., 2011) Detection of early carious lesions is of paramount importance. If the disease is detected early enough at the non-cavitated stage, it may be possible to enhance remineralisation or inhibit demineralisation by appropriate preventive measures. Therefore the early detection, assessment and correct diagnosis of those lesions are key targets in the overall effort to move away from operative towards non-operative preventive dentistry. (Warren *et al*., 2002) The changing disease patterns with a general caries associated with a relatively high number of non-cavitated caries lesions was one of the reasons that led to the development of the harmonised International Caries Detection and Assessment

System (ICDAS) in recent years. (Ismail *et al.*, 2008) The workshop on ICDAS II, was held in Baltimore, Maryland, USA, on March 12 through 14, 2005. The final outcome of the workshop was the revision of the ICDAS criteria which was referred to as ICDAS II. The system was intended to be feasible for use in epidemiological surveys and to detect cavitated and non-cavitated stage lesions with acceptable reliability. No previous data had been reported in Muradnagar block in which ICDAS II was used. Hencehere is an attempt made to look to determine association of dental caries prevalence and oral hygiene indicators among 12 and 15 years old school going children using ICDAS II.

MATERIALS AND METHODS

A cross-sectional school based survey was conducted during academic year 2013-2014 to assess association between Dental Caries prevalence and oral hygiene indicators using ICDAS II among 12 and 15 year old school children attending private and Government schools of Muradnagar, Uttar Pradesh, India. A total sample of 1000 children was assessed for the present study. The list of schools with their names, total student strength, strength by grade and range of ages was obtained from Basic Shiksha Adhikari. For representation of study subjects multistage sampling technique was applied to select study population. In first stage of sampling, Muradnagar was divided into urban and rural area to obtain equal representation of schoolchildren (n=500) from each area. In the second stage of sampling equal number of schoolchildren from both public and private schools of corresponding 12 and 15 years old were selected till estimated sample size (N =1000) was achieved.

The clinical examination was carried out by single trained and calibrated examiner. The standardization and calibration of the examiner was carried out on examining 20 pre-selected subjects twice with a time interval of one hour between examination applying study diagnostic criteria. The clinical examination of the subjects was conducted on an ordinary chair with high backrest and position of the examiner standing/seating behind or in front of the chair pertaining to examine variables. The data was recorded by investigator in pre-designed proforma. The proforma was divided into 2 parts. First part covers general information that comprise of demographic variables and socio-economic status to be filled by parents/guardians/caregivers. Second part comprised of questions regarding oral hygiene practices, dental behavioural indicators such as past dental care received to be filled by examiner through structured interview method. Plaque level was assessed by Patient Hygiene Performance (PHP) index. The cotton rolls was used for isolation. Disclosing agent was applied on all tooth surfaces using cotton swab to the identify plaque and it was recorded according to score and criteria of PHP index. Then the stained plaque was removed using wet gauze piece. The data obtained was subjected to analysis using SPSS software version 20. The Results on continuous measurements are presented on Mean ±SD (Min-Max) and results on categorical measurements are presented in Numbers (%). Significance is assessed at 5% level of significance. Chi – square, Mann-Whitney U and KruskalWallis tests had been used to find the significance of study parameters. The association between the dental caries and other variables was tested with the multinomial logistic regression.

RESULTS

Table 1. Demographic distribution of study population

Gender	Number of subjects	Percentage Distribution(%)
Male	464	46.4
Female	536	53.6
Total(N)	1000	100
location	Number of subjects	Percentage Distribution (%)
Urban	500	50.0
Rural	500	50.0
Total(N)	1000	100

Table 2. Age and Gender Wise Distribution of Socioeconomic Status (SES)

Age	Gender		SES					Total	Pearson chi-square value	p-value
			Upper	Upper middle	Lower middle	Upper lower	Lower			
12 years	Male	Frequency(N)	2	72	109	52	0	235		
		Percentage Distribution (%)	0.9%	30.6%	46.4%	22.1%	0.0%	100.0%		
	Female	Frequency(N)	1	64	160	40	0	265	10.27	0.016
		Percentage Distribution (%)	0.4%	24.2%	60.4%	15.1%	0.0%	100.0%		
15 years	Male	Frequency(N)	4	76	114	32	3	229		
		Percentage Distribution (%)	1.7%	33.2%	49.8%	14.0%	1.3%	100.0%		
	Female	Frequency(N)	3	63	161	43	1	271		
		Percentage Distribution (%)	1.1%	23.2%	59.4%	15.9%	0.4%	100.0%	8.53	0.074
12 years	Total	Frequency(N)	3	136	269	92	0	500		
		Percentage Distribution (%)	0.6%	27.2%	53.8%	18.4%	0.0%	100.0%		
15 years	Total	Frequency(N)	7	139	275	75	4	500	15.561	0.004
		Percentage Distribution (%)	1.4%	27.8%	55.0%	15.0%	0.8%	100.0%		
Total		Frequency(N)	10	275	544	167	4	1000		
		Percentage Distribution (%)	1.0%	27.5%	54.4%	16.7%	0.4%	100.0%		

**Table 3. Age wise comparison of ICDAS II score among study population**

Age(in Years)	Filled	Missing	Code 0	Code 1	Code 2	Code 3	Code 4	Code 5	Code 6	Total
12 years	29	8	266	10	20	25	50	54	35	500
	(5.8%)	(1.6)	(53.2%)	(2%)	(4%)	(5%)	(10%)	(10.8%)	(7%)	(50%)
	38	8	274	8	19	21	56	56	23	500
15 years	(7.6%)	(1.6%)	(54.8%)	(1.6%)	(3.8%)	(4.2%)	(11.2%)	(11.2%)	(4.6%)	(50%)
Total	67	16	540	18	39	46	106	110	58	1000
	(6.7%)	(1.6%)	(54%)	(1.8%)	(3.9%)	(4.6%)	(10.6%)	(11%)	(5.8%)	(100%)

Table 4. Association between Non-Cavitated and Cavitated carious lesion of study population with oral hygiene status

Carious lesion	Oral hygiene status	Mean	Std. Deviation	p-value
D1(code1-2)	Excellent	0.06	0.238	
	Good	0.22	0.412	
	Fair	0.24	0.429	0.001
	Poor	0.45	0.522	
	Total	0.21	0.406	
D2(code3-6)	Excellent	0.36	0.771	
	Good	0.28	0.699	
	Fair	0.26	0.668	0.740
	Poor	0.18	0.603	
	Total	0.29	0.701	

Table 5. Comparison between dental caries experience of study population with oral hygiene status

ICDAS Score	Excellent		Good		Fair		Poor		p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Filled	0.09	0.302	0.06	0.238	0.07	0.261	0.02	0.138	0.207
Missing	0.00	0.000	0.01	0.109	0.03	0.230	0.04	0.276	0.357
Code 1	0.00	0.000	0.02	0.15	0.1	0.12	0.04	0.193	0.000
Code 2	0.00	0.000	0.07	0.373	0.07	0.38	0.12	0.469	0.001
Code 3	0.27	0.905	0.25	0.834	0.13	0.605	0.12	0.58	0.339
Code 4	1.45	2.06	0.05	0.43	0.44	1.2	0.5	1.3	0.317
Code 5	0.00	0.000	0.24	1.07	0.57	1.5	0.67	1.71	0.000
Code 6	0.55	1.8	0.36	1.4	0.37	1.45	0.12	0.828	0.002
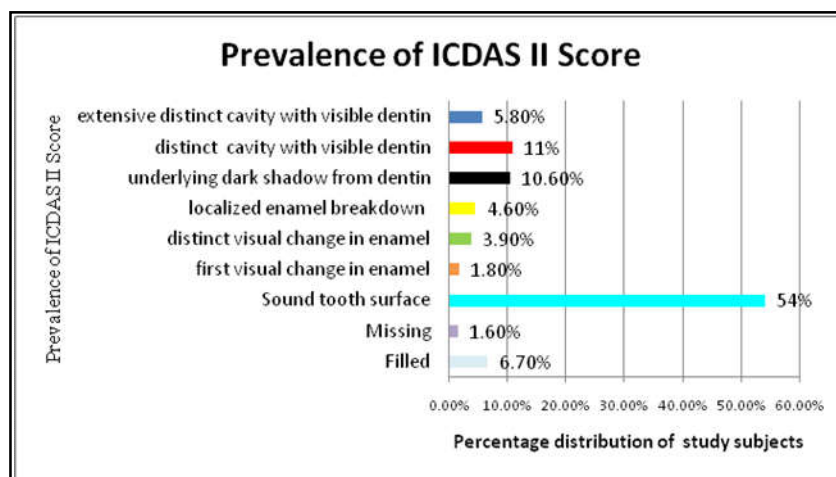
Graph 1. Prevalence of dental carious lesion according to ICDAS II score among study population

DISCUSSION

Detailed visual examination methods record early visible signs of the carious process such as opacities, brown discolorations, enamel breakdowns or microcavities without an obvious cavity. These visual signs have proven to be good indicators of the presence of enamel and/or dentin lesions. The changing disease patterns with a general caries decline associated with a relatively high number of non- cavitated caries lesions was one of the reasons that led to the development of the harmonized International Caries Detection and Assessment System II (ICDAS II). The ICDAS II (International Caries Detection and Assessment System) is the second version of a widely accepted system for coding and recording the severity of carious lesions. The system is peer-reviewed, evidenced-based and has a wide range of applications, including oral healthcare delivery,

epidemiology and dental research. It has been accepted by the International Dental Federation. The present study was to assess association of dental caries prevalence with oral hygieneindicators using ICDAS II among 12 and 15 years old school children in Muradnagar. The overall percentage was 46% including decayed, missed and filled teeth. The prevalence of cavitated carious lesion was greater than non-cavitated lesions 20.8% and 14.4% respectively. In present study, age and ICDAS was found to be significantly associated with each other (p-0.043). This is similar with results obtained by Ismail *et al*, Salman *et al*, Gasgoos and Derlerck *et al*. In smaller age group they have less severity for dental caries. This indicates increase in dental caries severity by increasing of age. In our study Gender was significantly associated with dental caries with male being more affected than females. These results was in accordance with findings of Ismail *et al*, Cadavid *et al*, Gasgoos, Baciu *et al* and Declerck *et al*. (2008, 2011 & 2008) The reason for this difference could be as girls care with their health, appearance, esthetics and also with their oral hygiene maintenance more than boys even at small ages. In our study the education of parent was significantly associated with code 1(first visual change in enamel) and Code 5(distinct change in enamel) (p-0.045 and 0.007) which is in accordance with results obtained Ismail *et al*, Mendes *et al*, Derleck *et al*. (2010, 1992 & 2008) Therefore educational level was a significant risk factor caries because of low education of parents. The oral hygiene status which was found to be significantly associated with dental caries due to presence of plaque can be used as marker for oral hygiene behaviour. The cleanliness of teeth was measured by plaque through PHP index. In present study the oral hygiene of the study population was found to fair which is similar to finding obtained from study done by Kim (2009).

Conclusion

In the light of the results obtained in the study, it was concluded that:

1. The plaque as depicted by Patient Hygiene Performance(PHP) index, was fair in 80.1%, followed by poor 10.4%, good 8.4% and excellent 1.1%
2. A female shows better oral hygiene then males.
3. The PHP scores showed an increase with age in the study population.
4. It was observed that in majority 54% teeth was sound, 11% first visual change, 10.6% distinct visual change, 6.7% filled, 5.8% initial breakdown in enamel followed by 4.6% non-cavitated surface, 3.9% distinct visual change while lowest in 1.8% extensive distinct cavity and 1.6% was missing.
5. The results of the present study showed that most of students 11.2% 12 years old were affected by non-cavitated surface with underlying dark shadow from dentin, followed by distinct cavity with visible dentin 10.8%, extensive distinct cavity 7%. Among 15 years

most of students were affected by 11.2% distinct cavity with visible dentin, followed by 10% non-cavitated surface with underlying dark shadow from dentin, extensive distinct cavity 4.6%.

6. Dental caries showed significant association with age, gender, level of education, occupation, frequency of tooth cleaning, frequency of changing toothbrush, time of tooth cleaning, tongue cleaning, past dental visit, duration of dental visit and dental care received during dental visit.
7. The ICDAS II showed significant association with PHP index
8. A higher means score 0.31 ± 0.723 of cavitated carious lesion was found among 15 years old school children.

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