

Assessment of various components of oral health status in different population groups of Meerut division of Western U.P.: A pathfinder survey

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Abstract

Introduction: Oral conditions have an impact on the quality of life of children in different ways, not just functionally, but also psychologically and socially. The diagnosis of oral diseases is thus, an essential aspect of dental practice.

Aim: To estimate the prevalence of dentofacial anomalies, dental fluorosis, dental trauma, oral mucosal lesions and dental erosion.

Materials and Method: The study was carried out amongst 5, 12 and 15- year old residents of urban, semi-urban and rural population of Meerut division of Western U.P, INDIA. 2100 children were examined in the study. Data was recorded in a self-designed proforma. Recordings were done according to WHO basic methods -4th and 5th edition. The collected data was subjected to statistical analysis.

Results: One way ANOVA was used for statistical analysis. Severe/handicapping malocclusion was observed in 5.2% of the children examined. Prevalence of dental fluorosis was 47.5% and that of dental trauma was 5.38% with enamel-dentin fracture being the most common occurrence. Prevalence of oral mucosal lesion was 1.14% with ulceration and abscess being more common with 11% prevalence. However, dental erosion was absent in all the population groups examined.

Conclusion: Malocclusion, dental fluorosis and dental trauma were found to be prevalent in the various population groups thereby emphasizing the need for regular conduct of oral health surveys and making appropriate strategies for prevention and prompt treatment.

Keywords: Dentofacial anomaly, Dental fluorosis, Oral mucosal lesion, WHO, Dental trauma.

Introduction

Oral diseases are major public health problems since their impact on individuals and communities, due to pain and suffering, impairment of function and reduced quality of life, is considerable. The common dental diseases tormenting mankind are dental caries and gingival diseases.¹ However, the data on the prevalence of other aspects of oral health like malocclusion, dental trauma, dental erosion and oral mucous lesions (namely Candidiasis, ulcerations, ANUG, abscess etc.) is limited.²

Enamel Fluorosis is hypoplasia or hypomineralisation of tooth enamel caused by chronic ingestion of excessive amounts of fluoride during the period when the tooth is developing. It is characterized clinically by lusterless, opaque, white patches in enamel which may be mottled, striated &/or pitted. In India, 62 million people including 6 million children are estimated to have serious health problems due to consumption of fluoride-containing water.³ Malocclusion is misalignment or incorrect relation between the teeth of two dental arches when they approach each other as the jaw closes. It is a dentofacial anomaly. It severely affects the aesthetics of face and may be coupled with mastication or speech problems. Since malocclusion affects a large segment of the population, it is by definition, a public health problem.⁴

There is yet another oral health condition, i.e. traumatic injury which is a distressing physical experience and may also have an effect on the emotional and psychological aspects of an individual. As oral tissues are highly sensitive, injuries to the mouth are typically very painful. Hence, they require prompt treatment from a dentist.⁵

Oral mucosal lesions namely abscess, ulcerations, candidiasis and ANUG are certain oral mucosal lesions which can cause discomfort or pain that interfere with mastication, swallowing and speech and can produce symptoms such as halitosis, xerostomia or oral dysesthesia, which may interfere with daily social activities.

Dental Erosion is a chemical dissolution of the dental hard tissues by intrinsic or extrinsic acids.⁶ There are many modifying factors affecting the host which significantly affect tooth susceptibility to dental erosion.

Basic oral health surveys provide a sound basis for assessing the current oral health status of a population and its future needs for oral health care. The planning for most of the comprehensive oral health care programs is based on the information gathered from surveys for oral health assessment.⁷ Therefore, the importance of regular oral health surveys for assessing the trends of not only caries and gingival diseases is important but those on diseases like dental fluorosis,

malocclusion, dental trauma, oral mucosal lesions, etc. cannot be overlooked. With this purpose, the present study was undertaken to assess the prevalence of dental erosion, dental trauma, malocclusion, dental fluorosis and oral mucosal lesions in children of Meerut division of Western Uttar Pradesh and thus making an attempt to prevent and treat these diseases at an early stage.

Materials and Method

It was a school-based study which was undertaken by the Department of Pedodontics and Preventive Dentistry, I.T.S-C.D.S.R, Muradnagar, to assess the prevalence of dental fluorosis, dental erosion, dental trauma, dentofacial anomalies and oral mucosal lesions and their treatment needs in children (as per the index ages of 5, 12 and 15 years defined by WHO) of 6 districts of Meerut division (Meerut, Baghpat, Gautam buddha nagar, Hapur, Ghaziabad and Bulandshahr) of Western U.P.

Before starting the study, ethical clearance was obtained from the Institutional Ethical Committee of ITS- CDSR Muradnagar, Ghaziabad. A sample of 2100 students was examined from different schools of 6 districts comprising of urban, semi-urban and rural populations of Meerut division of Western U.P. Informed written consent was taken from the parents of the students through school authorities to participate in the study followed by verbal consent of the students, before their participation in the study in order to prevent any inconvenience and to ensure full cooperation. The clinical examination was carried out by single trained and calibrated examiner to ensure consistent clinical judgments for reliable and valid data collection. An initial training and calibration exercise for the examiner was conducted prior to the study under the guidance of the principal investigator by the Department of Pedodontics and Preventive Dentistry, I.T.S-CDSR to check for the feasibility of the study methodology and coding system and also to ensure that a consistent standard of diagnosis was maintained. A group of 10 participants were examined both, by the examiner and the principal investigator daily, over a period of 1 week. The examination was repeated until both examiners had substantial co-relation as measured by Cohen's kappa statistical formula ($k > 0.06$). The examiner then re-examined the same participant so as to avoid chances of bias in the methodology during the coding/scoring. Once the examiner was trained, the study was initiated.

Children with signed informed consent were included in the study. Children undergoing orthodontic treatment, children who were on any medication or children with any systemic disease were excluded from the study.

The students were examined at their respective schools, using sterile mouth mirror and flash light. The data was recorded on a self-designed modified WHO

oral health assessment form 4th and 5th edition (1997 and 2013 respectively) which included information about certain variables like demographic data, dental trauma, dental fluorosis, dental erosion, dentofacial anomalies & oral mucosal lesions examination. Dental fluorosis, dental erosion, dental trauma and oral mucous lesions were recorded as per World Health Organization - Basic Methods 5th Edition(2013) and Dentofacial Anomalies as per World Health Organization - Basic Methods 4th Edition(1997).⁸

The forms were arranged in serial number & stacked in groups of 100. The bundles were labelled with student code numbers and date of recording to make them readily available for the data entry. The data was entered into an MS office excel sheet and then subjected to analysis using SPSS software version 20.0.

Results

A total of 2100 children were examined in the study. Table 1 represents distribution of participants according to different location and geographic location. Out of the total 2100 children examined, groups of 700 belonged to urban, semi-urban and rural population respectively. Table 2 represents distribution of DAI scores in the study population. It was found that out of 1369 subjects (12 and 15- year olds) assessed for dentofacial anomalies, 49.7% (681) had normal/minor malocclusion with DAI score of 13-25 suggesting no or slight need of treatment, 438 (32%) had definite malocclusion with DAI score of 26-30 suggesting need of elective treatment, 179 (13.1%) had severe malocclusion with DAI score of 31-35 suggesting highly desired treatment need and 71 (5.2%) had very severe/handicapping malocclusion with DAI score of >36 suggesting mandatory treatment need.

It was found that questionable type of fluorosis was the most common type of fluorosis seen in all population and age groups with its prevalence being 17.9% in 5- year olds, 26.7% in 12- year olds and 27.1% in 15 year olds (Table 3)

Enamel-dentin fracture and treated injury were the most common type of trauma found in our study. Treated injury was more prevalent amongst 5 & 12 year olds of semi-urban population with prevalence of 2.4% and 1.2% respectively while enamel-dentin fracture was seen more prevalent in 5- year olds of semi-urban and 15 -year olds of rural population with prevalence of 1.2% and 4.1% respectively(Table 4).

In our study, ulceration and abscesses were the most commonly found oral mucosal lesions. Ulcerations were most commonly seen amongst 5-year olds of semi-urban population i.e. 1.2%. Abscesses were more prevalent amongst 12- year olds of rural population and 15- year olds of urban population with prevalence of 1.3% and 1.8% respectively (Table 5). No sign of erosion was seen in any of the child examined in any age group in our study.

Table 1: Gender wise distribution of subjects of Meerut division of Western, U.P according to different locations

Location	Geographic location	Total N	Age in years	Gender	
				Male N %	female N %
Urban (700)	Meerut (350)	120	5	85 70.8	35 29.2
		111	12	85 76.6	26 23.4
		119	15	72 60.5	47 39.5
	Gautam Buddha Nagar (350)	205	5	127 62	78 38
		95	12	63 66.3	32 33.7
		50	15	41 82	9 18
Peri-urban (700)	Ghaziabad(350)	52	5	20 38.5	32 61.5
		131	12	76 58	55 42
		167	15	96 57.5	71 42.5
	Hapur (350)	116	5	73 62.9	43 37.1
		116	12	80 69	36 31
		118	15	87 73.7	31 26.3
Rural (700)	Baghpat (350)	119	5	77 64.7	42 35.3
		111	12	72 64.9	39 35.1
		120	15	80 66.7	40 33.3
	Bulandshahr (350)	119	5	72 60.5	47 39.5
		122	12	74 60.7	48 39.3
		109	15	61 56	48 44
Total		2100		1341 63.8	786 36.14

Table 2: Distribution of subjects according to their severity levels and relative treatment need on the basis of DAI scores in 12 & 15 year olds of Meerut division of Western U.P

Case severity levels and relative treatment need	DAI Score	Frequency (n)	Percent (%)
Normal or minor malocclusion; No treatment need or slight need	13-25	681	49.7
Definite malocclusion; Treatment elective	26-30	438	32.0
Severe malocclusion; Treatment highly desirable	31-35	179	13.1
Very severe (handicapping) malocclusion; Treatment mandatory	>36	71	5.2

Table 3: Prevalence of Dental fluorosis amongst 5, 12 and 15 year olds of Meerut division of Western Uttar Pradesh according to Dean's Index

Location	Age (in years)	Dental Fluorosis						Total N
		Normal (score 0) N %	Questionable (score 1) N %	Very mild (score 2) N %	Mild (score 3) N %	Moderate (score 4) N %	Severe (score 5) N %	
Urban (700)	5	269 82.8	41 12.6	13 4	2 0.6	0 0	0 0	325
	12	88 42.7	50 24.3	30 14.6	20 9.7	11 5.3	7 3.4	206
	15	77 45.6	36 21.3	19 11.2	18 10.7	15 8.9	4 2.4	169
	Total	434 62	127 18.1	62 8.9	40 5.7	26 3.7	11 1.6	
Peri-Urban (700)	5	118 70.2	30 17.9	15 8.9	5 3	0 0	0 0	168
	12	90 36.4	66 26.7	34 13.8	23 9.3	19 7.7	15 6.1	247
	15	114 40	62 21.8	36 12.6	37 13	27 9.5	9 3.2	285
	Total	322 46	158 22.6	85 12.1	65 9.3	46 6.6	24 3.4	
Rural (700)	5	184 77.3	34 14.3	20 8.4	0 0	0 0	0 0	238
	12	75 2.2	62 26.6	29 12.4	33 14.2	24 10.3	10 4.3	233
	15	86 37.6	62 27.1	35 15.3	27 11.8	13 5.7	6 2.6	229
	Total	345 49.3	158 22.6	84 12	60 8.6	37 5.3	16 2.3	2100

Table 4: Prevalence of Dental trauma amongst 5, 12 and 15 year olds of Meerut division of Western Uttar Pradesh according to WHO 5th edition

Location	Age (in years)	Dental Trauma							
		No sign of Injury (score 0)	Treated Injury (score 1)	Enamel Fracture Only (score 2)	Enamel-Dentin Fracture (score 3)	Pulp Involvement (score 4)	Missing tooth Due to trauma (score 5)	Other Damage (score 6)	Total
		N %	N %	N %	N %	N %	N %	N %	N
Urban (700)	5	319 98.2	3 0.9	0 0	0 0	1 0.3	1 0.3	1 0.3	325
	12	193 93.7	3 1.5	1 0.5	4 1.9	1 0.5	1 0.5	3 1.5	206
	15	158 93.5	0 0	2 1.2	7 4.1	0 0	1 0.6	1 0.6	169
	Total	670 95.7	6 0.9	3 0.4	11 1.6	2 0.3	3 0.4	5 0.7	
PERI-URBAN (700)	5	162 96.4	2 1.2	2 1.2	0 0	2 1.2	0 0	0 0	168
	12	225 91.1	6 2.4	1 0.4	5 2	3 1.6	4 1.6	2 0.8	247
	15	266 93.3	2 0.7	1 0.4	4 1.4	3 1.1	6 2.1	3 1.1	285
	Total	653 93.3	10 1.4	4 0.6	9 1.3	9 1.3	10 1.4	5 0.7	
Rural (700)	5	232 97.5	2 0.8	1 0.4	1 0.4	1 0.4	1 0.4	0 0	238
	12	215 92.3	5 2.1	3 1.3	3 1.3	1 0.4	2 0.9	4 1.7	233
	15	217 94.8	2 0.9	0 0	7 3.1	0 0	3 1.3	0 0	229
	Total	664 94.9	9 1.3	4 0.6	11 1.6	2 0.3	6 0.9	4 0.6	

Table 5: Prevalence of Oral mucosal lesion amongst 5, 12 and 15 year olds of Meerut division of Western Uttar Pradesh according to WHO 5th edition

Location	Age in years	Oral mucosal lesion						Total
		No abnormal condition (score 0)	Ulcerations (score 1)	Anug (score 2)	Candidiasis (score 3)	Abscess (score 4)	Other Condition (score 8)	
		N %	N %	N %	N %	N %	N %	
Urban (700)	5	324 99.7	1 0.3	0 0	0 0	0 0	0 0	325
	12	203 98.5	1 0.5	1 0.5	0 0	1 0.5	0 0	206
	15	165 97.6	1 0.6	0 0	0 0	3 1.8	0 0	169
	Total	692 98.9	3 0.4	1 1.1	0 0	4 0.6	0 0	700
Peri-urban (700)	5	166 98.8	2 1.2	0 0	0 0	0 0	0 0	168
	12	244 98.8	0 0	0 0	0 0	3 1.2	0 0	247
	15	282 98.9	2 0.7	1 0.4	0 0	0 0	0 0	285
	Total	692 98.9	4 0.6	1 0.1	0 0	3 0.4	0 0	700
Rural (700)	5	235 98.7	2 0.8	0 0	0 0	1 0.4	0 0	238
	12	228 97.9	2 0.9	0 0	0 0	3 1.3	0 0	233
	15	229 100	0 0	0 0	0 0	0 0	0 0	229
	Total	692 98.9	0 0	0 0	0 0	4 0.6	0 0	700

Discussion

Limited availability and accessibility to oral health services and the lack of health promotion and effective preventive programmes are associated with poor oral health.⁸ Therefore, the importance of regular oral health surveys for assessing the trends of not only caries and gingival diseases is important but also in diseases like dental fluorosis, malocclusion, dental trauma, oral mucosal lesions, etc. cannot be overlooked. With this purpose, the present study was undertaken to assess the prevalence of dental erosion, dental trauma, malocclusion, dental fluorosis and oral mucosal lesions in children of Meerut division of Western Uttar Pradesh and thus making an attempt to prevent and treat these diseases at an early stage.

In our study, Meerut division of Western U.P. was chosen because areas/districts that are included in it were more accessible than any other division of Western U.P. Moreover, to the best of our knowledge, no study has been undertaken to study various oral health components in this area.

Out of the 2100 children examined, 1369 were examined for dentofacial anomalies (i.e. only 12 and 15-year olds). It was seen that 49.7% had DAI score of 13-25 with no/minor malocclusion requiring no or slight orthodontic treatment which is much lower than the prevalence found in studies done by Deepak et al⁵ in Himachal Pradesh, Anubhav et al⁹ in Muradnagar and Shivakumar et al¹⁰ in Davangere who found prevalence

of minor malocclusion as 87.5%, 66.9% and 79.9% respectively.

In the present study, out of 1369 subjects, 32% had DAI score of 26-30 with definite malocclusion suggesting need of elective treatment which is much higher than the prevalence found in studies done by Deepak et al⁵ in Himachal Pradesh, Anubhav et al⁹ in Muradnagar and Shivakumar et al¹⁰ in Davangere who found prevalence of definite malocclusion as 8%, 22.1% and 15.4% respectively.

In the present study, out of 1369 subjects, 13.1% had DAI score of 31-35 with severe malocclusion suggesting highly desired treatment need which is much higher than the prevalence found in studies done by Deepak et al⁵ in Himachal Pradesh, Anubhav et al⁹ in Muradnagar and Shivakumar et al¹⁰ in Davangere who found prevalence of severe malocclusion as 3.1%, 6.5% and 4.2% respectively.

In the present study, out of 1369 subjects, 5.2% had DAI score of >36 with very severe/handicapping malocclusion suggesting mandatory treatment need. Similar result was found in a study done by Rekha et al¹¹ in Mangalore who found prevalence of very severe malocclusion to be 5.2%. This prevalence was higher than the prevalence found in studies done by Deepak et al⁵ in Himachal Pradesh, Anubhav et al⁹ in Muradnagar and Shivakumar et al¹⁰ in Davangere who found prevalence of very severe malocclusion as 1.3%, 4.4% and 0.5% respectively.

The reason for this difference in DAI scores can be related to the inherent differences in tooth size and arch size since DAI includes measurements of the most relevant orthodontic traits (such as crowding) that affects dental aesthetics. In addition, these differences can be related to differences in region, geographic location and gender.

Dental fluorosis is the most convenient biomarker of exposure to fluoride and the evaluation of prevalence and severity of dental diseases as required for planning and implementing oral health programs in a given population. In the present study, overall prevalence of dental fluorosis was found to be 47.5% which is in accordance with the study done by Varsha D et al¹² in 6-14 year olds in Davangere (44.6%) but was much higher in comparison to the study done in Tamil Nadu by Punitha VC et al¹³ (19.2%). However, prevalence of fluorosis in our study was found to be much lower than the study done by Shanthi M et al¹⁴ in 9-12 year olds of Kolar (74.9%). The proportion of students with very mild and mild dental fluorosis as per Dean's index was 11% and 7.9% respectively. This low prevalence may be attributed to less consumption of ground water for drinking purposes and increase in supply of treated water for household consumption as per revised guidelines of the Central Government.

The present study reports that the prevalence of dental fluorosis was found to be higher among the children in the age group of 12 years i.e. 25.9%,

followed by the prevalence of 23.4% among the children in the age group of 15 years. In the present study, most commonly occurring condition was questionable fluorosis. It had highest prevalence in all three populations, urban, semi-urban and rural. In urban and rural population, the most affected age group was 12-years while in semi-urban population the most affected age group was 15years. Severe fluorosis was found to be highly prevalent in 12 year age group.

Traumatic dental injury (TDI) in children is considered as an important public health problem because of its high prevalence and lack of education. In our study, treated injuries were found in 1.19% subjects which were very low compared to the study done by Chopra A et al⁶ in 12-15 year olds of Panchkula, in which the prevalence was found to be 3.5%. Our study showed low prevalence of treated injury which could be due to lack of adequate knowledge and proper motivation concerning TDI among children, parents, and teachers. It may be compounded further by limitations imposed due to socioeconomic constraints. In the present study, most commonly found dental trauma was enamel-dentin fracture which had highest prevalence in urban and rural population i.e. 1.6% and 1.6%. Also, the prevalence of traumatic injury was 5.68% in 12 year olds and 5.56% in 15 - year old which was much lower than in study done by Prasad S et al⁶ where it was found to be 13.5% in 12- year olds of Gurgaon district. Another study reported a percentage of 15.1% in 12 year olds of Davangere, South India. Similarly, Kumar A et al¹⁵ (2011) observed a prevalence of 14.4% in 12-15 year olds of Ambala district and Haryana. Dua R et al¹⁶ observed a prevalence of 14.5% among 7 to 12 year old school children in Dera Bassi. Another recent observation made by Patel MC et al¹⁷ (2012) found a prevalence of 8.79% in 8-13 year olds in Vadodara city.

The diagnosis of oral mucosal lesions and normal variants of the oral mucosa is an essential aspect of dental practice, and traditionally, the mucosal membrane of the oral cavity has been looked upon as a mirror of general health. Out of the 2100 children examined in this study, 1.14% had oral mucosal lesions. The prevalence of oral manifestations in the soft tissues of children during early childhood was found to be 34.8% in a study done in Brazil, which is much higher than the prevalence observed in our study. A study done by Jahanbani et al¹⁸ reported prevalence of 28% of oral mucosal lesion in Iran. This wide variation in prevalence of oral mucosal lesion may be due to function of underlying differences in the geographic areas studied, socio-demographic characteristics of the examined population, the research methodologies used, and the diagnostic criteria employed. Ulcerations and abscess accounted for most commonly found oral mucosal lesions in our studied sample with population percentage of 11%. In the present study, most commonly found oral mucosal lesion was abscess with

prevalence of 0.6%, 0.4% and 0.6% in urban, semi-urban and rural population respectively. In semi-urban and rural population, most affected children were of the 12-years age group while in urban location, 15 year olds were affected more. Candidiasis was not seen in any of the child examined in any population.

In our study, we did not find any children who had dental erosion in any of the age groups. This may be due to the awareness of parents and children about their dental health in urban and semi-urban population while in rural population, low socio-economic status and different lifestyle may be the reason.

Conclusion

There is a huge burden of unmet treatment needs amongst children. The evaluation of the overall oral health revealed that the greatest need was for prevention and treatment of malocclusion and fluorosis, followed by dental trauma. However, additional epidemiological surveys in other division of Western Uttar Pradesh would further enhance our knowledge on the prevalence of dentofacial anomalies, dental fluorosis, dental trauma, oral mucosal lesions and dental erosion.

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