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Relationship of crowded teeth and dental calculus among rural school children in Greater Noida, Uttar Pradesh

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Abstract

Alveolar ridge preservation is a set of surgical techniques to preserve the volume of the alveolar ridge. The crowding of teeth predisposes a challenge in maintaining oral hygiene through meticulous brushing as the tooth irregularity causes dental calculus accumulation leading to dental caries and gingivitis finally leading to tooth mobility.

Aim: The objective was to find the relationship of crowded teeth and dental calculus among rural school children in Greater Noida, Uttar Pradesh

Methodology: This analytic study with of cross sectional design on 150 primary school children aged between 6 to 13 years(Class I to V) studying in rural government school in Sakipur village of Greater Noida where they were provided mid-day meal. Crowding of anterior teeth (canine-canine) of lower jaws was recorded. The examination was performed by placing the explorer on 1/3 incisal or occlusal area and gently moving it to the 1/3 gingival or cervical area on a specific tooth.

Result: The results of the study were tested with the Chi-square test. The findings of this research reveal that dental calculus grade 2+ was significantly more among males whereas grade 3+ dental calculus was significantly more among females. Children aged 12-13 year old children showed statistical significance when asked whether they were demonstrated brushing technique by dentist. Dental calculus was significantly more among subjects with crowding. Males also had a significantly higher prevalence of dental anomalies like rotated teeth and peg shaped lateral than females which was seen to be statistically significant.

Conclusion: The abnormal arrangement of teeth like crowding, rotation and dental anomalies influences the condition of oral hygiene in children.

Keywords: crowding, oral hygiene, dental staining

Introduction

Dental irregularities in dentition make it difficult to clean teeth and maintain good oral hygiene leading to gingivitis and periodontitis. [1] Malocclusion ranks third after dental caries and periodontal disease as a major problem in oral health. [2, 3]

Crowding of lower anteriors is a predisposing factor because oral hygiene maintenance is more difficult without putting additional efforts and giving time to undercuts between the crowded teeth. Bacterial plaque is retained, accumulates and becomes unreachable leading to pathological periodontal changes [3].

Methodology

A descriptive cross sectional study was conducted to study relationship between malocclusion mainly lower anterior crowding and prevalence of poor oral health (hygiene) measured through dental staining in 150 (54 boys and 96 girls) rural primary school children aged 6-13 years in Sakipur village of Greater Noida. The exclusion criteria were already orthodontically treated children with no anterior crowding, children with systemic diseases and medically compromised children, mentally and physically challenged children, mouth breathers, consumed antibiotic therapy during the last three months, children with para-functional habits, cleft lip and palate children, children having craniofacial syndromes and previous history of periodontal therapy, Inclusion criteria were children with fully erupted permanent molars, children with congenitally missing teeth, supernumerary teeth, and dental anomaly aberrations

of tooth size and shape, children with low socioeconomic backgrounds and studying in a school provided mid-day meal school. A formal consent was taken from the principal of the school. All the recordings were done in the daylight and the child was made to sit in chair facing away from a direct sunlight. The clinical examination process was visual using a mouth mirror following WHO guidelines and adequate infection control by using new gloves for each subject, new barrier sleeves for mouth mirror handles for each participant, new mouth mirror heads for each participant, ice cream sticks and hand disinfectant. The data of each child was documented in survey proformas and they were asked about whether they have been demonstrated brushing technique by dentist. All responses were tabulated using Microsoft-Excel 2007 Software for data analysis using Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 25.0. Descriptive statistics was calculated and *t*-test, chi square test was used for group comparisons.

Result

The sample of 150 school children where 36% (n=54) were boys and 64% (n=96) were girls (Figure 1). 93.3% of the school children were aged between 7 to 12 years where 32% of children were 9 years and 4% were 13 years old (Figure 2). A value of *P* < 0.05 was considered as statistically significant.

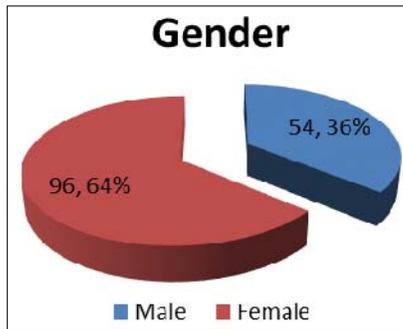


Fig 1: Gender

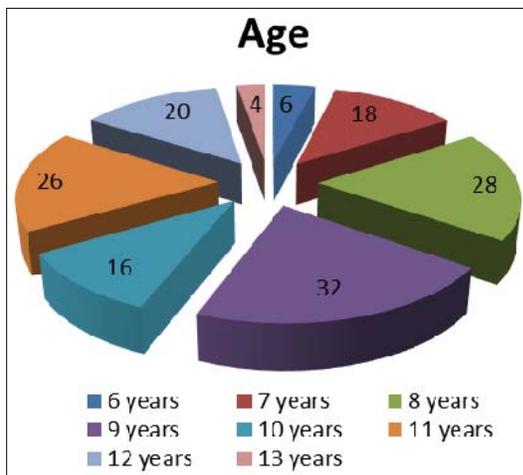


Fig 2: Age

A comparison was made between boys and girls of distribution of tooth brushing been ever demonstrated by dentist in the children was done using the chi-square test where no significant difference was seen (Table 1) (Figure 3).

Table 1: Chi-square test Non-significant difference

Has brushing been ever demonstrated by dentist	Male	Female	Total
No	44	88	132
	81.5%	91.7%	88.0%
Yes	10	8	18
	18.5%	8.3%	12.0%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 3.395, p-value = 0.065

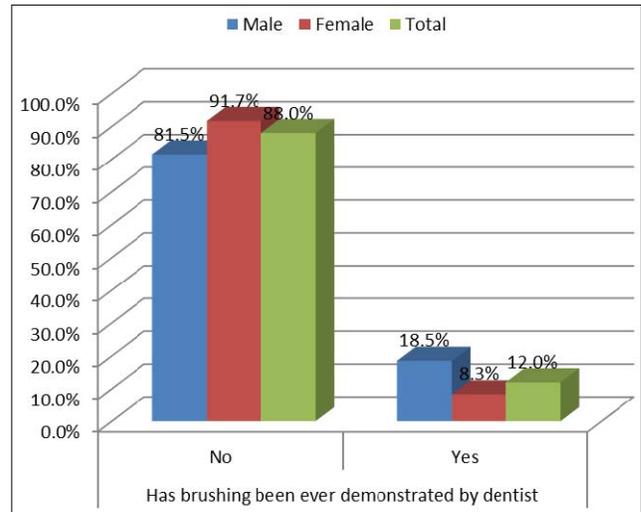


Fig 3: Chi-square test Non-significant difference

Table 2: Chi-square test*Significant difference

Dental calculus	Boy	Girl	Total
1+	44	78	122
	81.5%	81.3%	81.3%
2+	0	8	8
	0.0%	8.3%	5.3%
3+	10	10	20
	18.5%	10.4%	13.3%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 6.202, p-value = 0.045*

The distribution of dental calculus been ever demonstrated by dentist was compared between males and females using the chi-square test. Dental calculus 2+ was significantly more among males whereas dental calculus 3+ was significantly more among females (Table 2) (Figure 4).

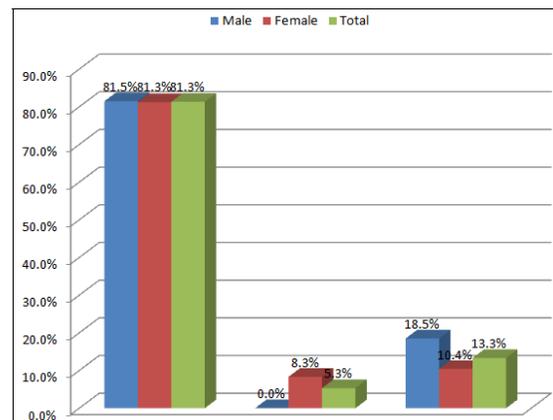


Fig 4: Dental calculus 1+ 2+ 3+

Table 3: Chi-square test* Significant difference

Has brushing been ever demonstrated by dentist	Age			
	6-7 years	8-9 years	10-11 years	12-13 years
No	24	53	36	14
	100.0%	93.0%	90.0%	58.3%
Yes	0	4	4	10
	0.0%	7.0%	10.0%	41.7%
Total	24	57	40	24
	100.0%	100.0%	100.0%	100.0%

Chi-square value = 24.031, p-value = 0.001*

The distribution of brushing method been ever demonstrated by dentist was compared between 6-7, 8-9, 10-11 and 12-13 years age groups using the chi-square test. 12-13 year old children showed a significance of brushing technique been demonstrated by dentist (Table 3) (Figure 5).

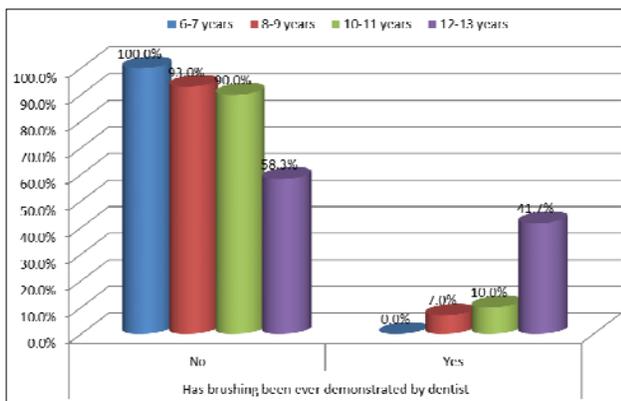


Fig 5: Chi-square test* Significant difference

Table 4: Chi-square test# Non-significant difference

Dental calculus	Age			
	6-7 years	8-9 years	10-11 years	12-13 years
1+	20	48	34	16
	83.3%	84.2%	85.0%	66.7%
2+	2	2	2	2
	8.3%	3.5%	5.0%	8.3%
3+	2	7	4	6
	8.3%	12.3%	10.0%	25.0%
Total	24	57	40	24
	100.0%	100.0%	100.0%	100.0%

Chi-square value = 5.229, p-value = 0.515

The distribution of dental calculus was compared between 6-7, 8-9, 10-11 and 12-13 years age groups using the chi-square test. There was no significant difference in distribution of dental calculus between males and females (Table 4).

Table 5: Chi-square test# Non-significant difference

Crowding	Age groups			
	6-7 years	8-9 years	10-11 years	12-13 years
Absent	22	53	39	18
	91.7%	88.3%	92.9%	75.0%
Present	2	4	3	6
	8.3%	7.0%	7.5%	25.0%
Total	24	60	42	24
	100.0%	100.0%	100.0%	100.0%

Chi-square value = 5.091, p-value = 0.165

The distribution of crowding was compared between 6-7, 8-9, 10-11 and 12-13 years age groups using the chi-square test. There was no significant difference in distribution of crowding between 6-7, 8-9, 10-11 and 12-13 years age groups (Table 5) (Figure 6).

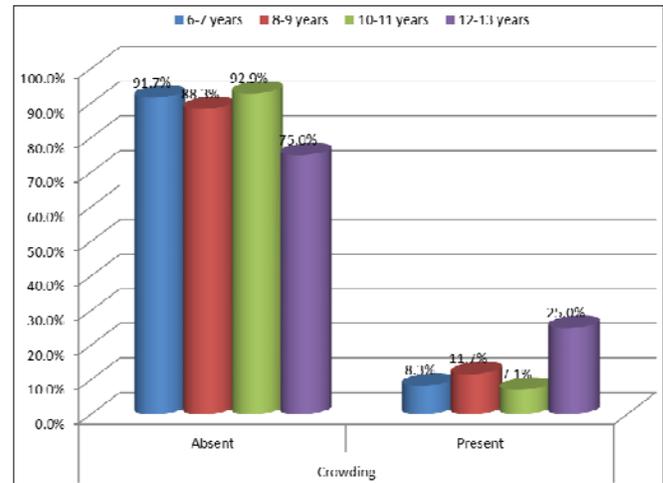


Fig 6: Chi-square test# Non-significant difference

Table 6: Chi-square test# Non-significant difference

Retroclination	Age groups			
	6-7 years	8-9 years	10-11 years	12-13 years
Absent	18	52	34	22
	75.0%	86.7%	81.0%	91.7%
Present	6	8	8	2
	25.0%	13.3%	19.0%	8.3%
Total	24	60	42	24
	100.0%	100.0%	100.0%	100.0%

Chi-square value = 3.104, p-value = 0.376

The distribution of retroclination of upper anteriors was compared between 6-7, 8-9, 10-11 and 12-13 years age groups using the chi-square test. There was no significant difference in distribution of retroclination between 6-7, 8-9, 10-11 and 12-13 years age groups (Table 6).

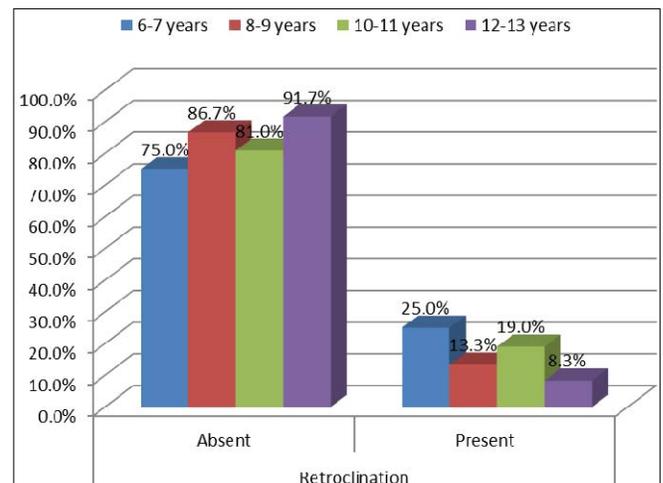


Fig 7: Retroclination

Table 7: Chi-square test* Significant difference

Rotation	Age groups			
	6-7 years	8-9 years	10-11 years	12-13 years
Absent	21	60	42	23
	87.5%	100.0%	100.0%	95.8%
Present	3	0	0	1
	12.5%	0.0%	0.0%	4.2%
Total	24	60	42	24
	100.0%	100.0%	100.0%	100.0%

Chi-square value = 11.943, p-value = 0.008*

Rotated teeth were significantly more among 6-7 years age group when distribution was compared between 6-7, 8-9, 10-11 and 12-13 years age using chi square test (Table 7) (Figure 8).

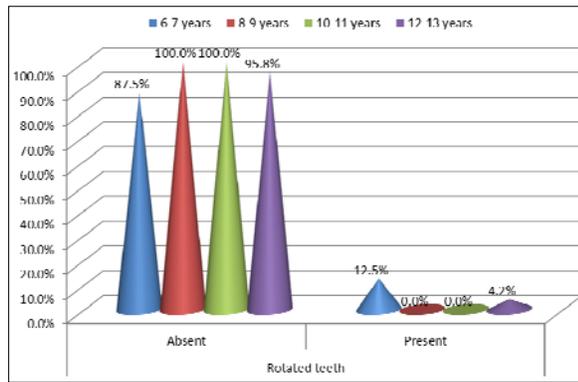


Fig 8: Chi-square test* Significant difference

Table 8: Chi-square test# Non-significant difference

Crowding	Male	Female	Total
Absent	49	83	132
	90.7%	86.5%	88.0%
Present	5	13	18
	9.3%	13.5%	12.0%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 0.600, p-value = 0.439

The distribution of crowded teeth in the lower anteriors was compared between males and females using the chi-square test. There was no significant difference in distribution of crowded teeth between males and females (Table 8) (Figure 9).

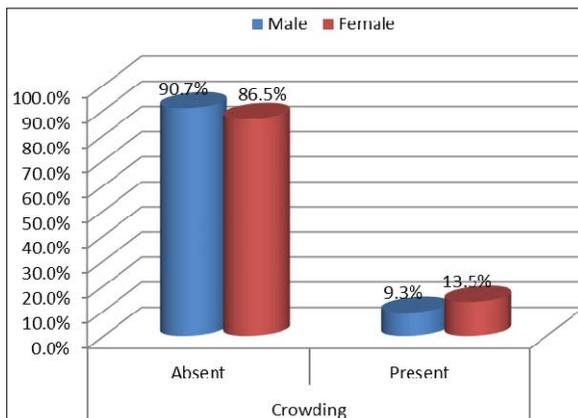


Fig 9: Chi-square test# Non-significant difference

Table 9: Chi-square test# Non-significant difference

Retroclination	Male	Female	Total
Absent	45	81	126
	83.3%	84.4%	84.0%
Present	9	15	24
	16.7%	15.6%	16.0%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 0.028, p-value = 0.867

The distribution of retroclination of upper teeth was compared between males and females using the chi-square test showed no significant difference (Table 9).

Table 10: Chi-square test* Significant difference

Peg shape Lateral	Male	Female	Total
Absent	50	96	146
	92.6%	100.0%	97.3%
Present	4	0	4
	7.4%	0.0%	2.7%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 7.306, p-value = 0.007*

Peg shaped lateral was significantly more among males compared to females (Table 10) (Figure 10).

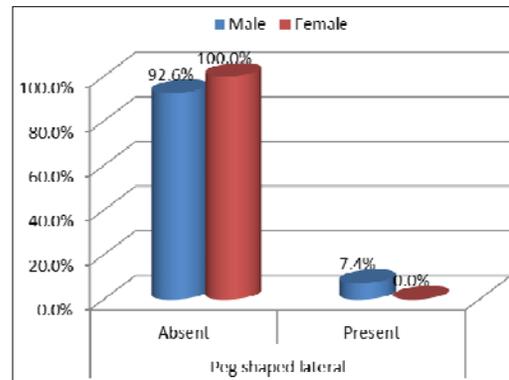


Fig 10: Chi-square test* Significant difference

Table 11: Chi-square test* Significant difference

Rotation	Male	Female	Total
Absent	50	96	146
	92.6%	100.0%	97.3%
Present	4	0	4
	7.4%	0.0%	2.7%
Total	54	96	150
	100.0%	100.0%	100.0%

Chi-square value = 7.306, p-value = 0.007*

Rotated teeth was significantly more among males compared to females (Table 11).

Table 12: Chi-square test* Significant difference

Dental calculus	Crowding		Total
	Absent	Present	
1+	107	15	122
	81.1%	83.3%	81.3%
2+	6	2	8
	4.5%	11.1%	5.3%
3+	19	1	20
	14.4%	5.6%	13.3%

Chi-square value = 2.172, p-value = 0.046*

The distribution of dental calculus was compared between subjects with and without crowding using the chi-square test. Dental calculus was significantly more among subjects with crowding (Table 12) (Figure 11).

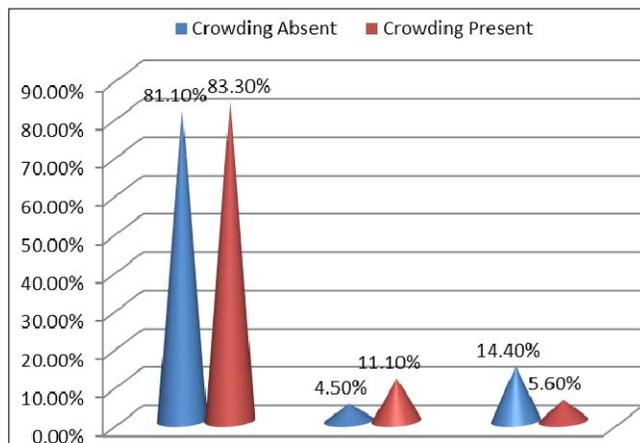


Fig 11: Dental calculus 1+ 2+ 3+

Discussion

Crowding of teeth happens when there is a disharmony between available basal arch length and arch length needed for symmetric arrangement of tooth^[4]

Rosihan stated the characteristics of malocclusion especially crowded teeth causing trapping of food debris between the teeth making it difficult during tooth brushing and when food debris was accumulated the bacteria turned it to plaque making the cleanliness difficult^[4]

Kragt *et al.* observed impact of malocclusion on OHRQOL more in children aged between 11 and 14 years than younger ones^[5]

Malocclusion is a multifactorial problem caused by genetic, environmental, and ethnic factors.^[6] According to NHANES III, in U.S., the prevalence of malocclusions in mixed dentition is between 20% and 55% and in Asia ranged from 87.79% in India to 77.1% in Iran^[7] Crowding was the most common anomaly recorded to be about 66.6% (mild, moderate and severe) and no significant gender differences were observed^[8]

In our study the difference of lower anterior crowding was insignificant among genders whereas dental calculus was seen more in children with crowding. Irregular teeth retained more dental calculus than straight teeth with statistically significance ($p=0.046$). Rotated teeth was seen significantly more among males ($p=0.007$). 5.6% of children with dental calculus score of grade 3+ showed dental crowding and 11.1% with dental calculus grade 2+ showed dental crowding. Arora and Bhateja observed a decrease in oral hygiene status of the school children having malocclusion to be Mean Plaque 1.21 ± 0.41 than having normal occlusion 1.12 ± 0.33 ^[9] The prevalence of presence of dental calculus among 12-year-old school children having malocclusion (0.72 ± 0.95) was higher than the children having normal occlusion (0.54 ± 0.88) but it was seen to be statistically non-significant ($t = 0.95, P = 0.093$)^[9]

Also a decrease in oral hygiene status of the school children having malocclusion (1.21 ± 0.41) than normal occlusion (1.12 ± 0.33) was seen^[9]

The regular maintenance of oral hygiene is by dental check-up once in every six months which helps in early diagnosis. Flossing is recommended to access areas where toothbrush is

inaccessible. The area of inaccessible stain and plaque can be eliminated by regular supragingival and subgingival scaling procedure for a favourable oral hygiene.

This study correlated crowding of lower anterior teeth with oral hygiene and focuses on important role of motivation in children to maintain oral hygiene, practice proper brushing technique and orthodontic management of teeth for oral hygiene easily.

Conclusion

This study shows statistical significance between the crowded teeth and dental calculus among the rural school children in Uttar Pradesh. Males also had a significantly higher prevalence of dental anomalies than females.

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