ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2020; 6(1): 13-16

www.oraljournal.com
Received: 10-11-2019
Accepted: 12-12-2019

Dr. K Abhirami
Dental Surgery, PSG Institute of Medical Science and Research Coimbatore, Tamilnadu, South Zone, India

Dr. G Valli
Dental Surgery, PSG Institute of Medical Science and Research Coimbatore, Tamilnadu, South Zone, India

Corresponding Author:
Dr. K Abhirami
Dental Surgery, PSG Institute of Medical Science and Research Coimbatore, Tamilnadu, South Zone, India

Evaluation for prevalence of malocclusion among adults and need for orthodontic treatment: A cross sectional study

Dr. K Abhirami and Dr. G Valli

Abstract
Aim: The aim of this cross-sectional study was to find the percentage of prevalence of malocclusion and the type of occlusal trait from urban –rural population of age group 17-23 in a college in Coimbatore district.
Materials and Method: A descriptive cross -sectional study with purposive sampling method.
Statistical test used: Examinations were computerized and analyzed using statistical package for social science version 24. Chi square test was used for computing statistical significance.
Result: The difference in prevalence of malocclusion in college students from rural and urban area was significant with the prevalence being more in rural population.
Conclusion: Malocclusion is widely spread among young adult population with greater prevalence in students from rural area, with Angles class I to be the most predominant type of malocclusion. The type of occlusal trait in rural students was proclination and the urban students had maxillary anterior crowding.

Keywords: Crowding, malocclusion, over jet, overbite, prevalence

1. Introduction
In such a diverse country like India a large variation in prevalence of malocclusion exist in various regions of our country. The data on orthodontic awareness and treatment need is very scanty. Malocclusion is undoubtedly a public concern in young population that require the orthodontic treatment need in India. There is no record of the earlier reports to the prevalence of malocclusion, the occlusal trait and orthodontic treatment need in college going students of age 17-23 in Coimbatore district, Tamil Nadu state, India.
With the greater attention to aesthetics in recent years there is a notable increase in orthodontic treatment need in demand as a consequence of a higher perception rate of malocclusion [1, 2].
In a vast country like India there is a wide range of variation in the prevalence of malocclusion like 20.4% in Shimla city in Himachal Pradesh [3], 38.7% in Davangree Karnataka [4], 52% in Nalgonda Telengana [5], 66% in Jaipur [14], 80% in Ahmednagar in Maharashtra [6], 83.3% in Kozhikode district in kerela [7], 83.3% in Hyderabad in Telengana [8], 87.4% in Leh [9].
The aim of this study was to record prevalence of malocclusion and to define difference in occlusal trait in urban and rural population and the orthodontic treatment need.

2. Materials and Method
2.1. Study Design: Descriptive cross-sectional study. A health screening camp of dental, opthalmology and general medicine was conducted for students in a private college in Coimbatore from 22-1-2018 to 22-2-2018 and about 3500 students were screened by a team of doctors from PSGUHTC. Two examiners were involved in this research study, examiner A and examiner B. The study was carried out for a period of 28 days approximately examining 125 students per day. Demographic data including name, age, gender and permanent address of the candidate were recorded. The Inclusion criteria were subjects with permanent dentition, with no remaining deciduous dentition, subjects with age group of 17-23, Students present during the period of oral examination. Students with missing 1st molar, facial trauma, history of previous or ongoing orthodontic treatment were excluded from the study.

3. Ethical clearance
The study protocol was submitted to the institutional ethical committee [PSGIMSR] and clearance was obtained Project no: 18/205. July 30th 2018.

4. Training and calibration of examiner
Oral examination was performed by two trained and calibrated examiners. Before the survey, both the examiners and recording clerks were participated in a training and clinical calibration program in the department. Following this training, 10% of the children were examined by each of the two investigators to assess inter - examiner reliability and Kappa Values of 0. 87 and 0.88 were found respectively. There was good agreement between the examinations by the same examiner. The interview and examination of a single study subject took 3 to 4 minutes. Each subject was examined by a single examiner with aid of natural light. With head in natural position with a metallic ruler. Torch was used whenever required. This was measured to.5mm measurements, if unsure lower score was considered. The criterion was limited to occlusal anterior-posterior (A-P) relationship, crowding, over jet, overbite, midline diastema.[10]

5. Sample Design
Probability sampling method.

5.1. Sample size
Sample size was calculated with the reference to Mahajen *et al.* [16] using prevalence of malocclusion as 82%.
Sample size was calculated using formula n = $4xpq/d^2$ and found to be n= 103.

6. Method of registration
Sagital occlusal relationship was recorded using angles classification system as class I, II, III. According to occlusal relationship of 1st molar and other occlusal traits such as overjet, over bite based on the method of Bioerk *et al.* [11] for registration of Malocclusion in centric occlusion. Overbite was recorded as normal, followed by deep bite (>2/3) of lower incisors were covered by upper incisors) and open bite as no overlap (based on incisors overlap relation in the vertical dimension).over jet was recorded as normal (0-4mm),increased (>4mm) and deficient (<0mm),depending on the horizontal distance between the labial surface of the upper and lower incisors, and crowding was considered as present when there was over lapping of one tooth with respect to the other tooth.

7. Result
Prevalence of malocclusion in rural and urban population in a private college in south Indian population in Coimbatore district of age group 17-23 were taken for the study, the total sample size was 3313 students, out of which 1452 from rural area and 1861 were from urban area. The difference in prevalence of malocclusion in rural and urban students (88%vs82%) was significant statistically with (p =0.0001) (Table-1).

Table 1: Prevalence of Malocclusion in college students from urban - rural area

Occlusion	Rural		Urban		Total		P-Value
	n	%	n	%	n	%	
Normal	233	16.05	410	22.04	643	19.4	<0.0001*
Malocclusion	1219	83.95	1451	77.96	2670	80.5	
Total	1452	100	1861	100	3313	100	

(*P<0.05 significant, CI: 0.56-0.81)

The distribution of occlusal traits in urban and rural area: 19% had class I normal occlusion.16% of rural and 22% of urban population had class I normal occlusion with the statistically significant difference between rural and urban population (p=0.0001) class I sagittal occlusion was found in 85% of the subjects, class II in 11% and class III in 4% with the statistically significant difference (p=0.0001) between two groups. (Table-2)

Table 2: (AP relation) Prevalence of occlusal trait in college students from urban - rural area.

Occlusion	Rural						Urban						P-Value
	I		II		III		I		II		III		
A-P relation	n	%	n	%	n	%	n	%	n	%	n	%	<0.0001*
	1276	88	130	9	46	3	1526	82	251	13	84	5	

(*P<0.05 significant)

Normal over jet was seen in 43.5%, excessive in 33% and reduced in 23.5%. The difference between the urban and rural population was statistically significant (p=0.0001) with rural population having more of increased over jet. (Table-3)

Table 3: Prevalence of overjet in college students from urban - rural area.

Overjet	Urban		Rural		P-Value
	n	%	n	%	
Normal	763	41	668	56	<0.0001*
Excessive	539	29	537	37	
Reduced	559	301	247	17	

(*P<0.05 significant)

Normal overbite was seen in 55.5%, deep in 28.5% and reduced in 16% of total sample. The difference between urban and rural population was statistically significant (p=0.0001) with urban population having more of deep bite. (Table -4)

Table 4: Prevalence of overbite in college students from urban - rural area.

Overbite	Urban		Rural		P-value
	n	%	n	%	
Normal	911	49	908	62	<0.0001*
Excessive	688	37	287	20	
Reduced	262	14	257	18	

(*P<0.05 significant)

The frequency of crowding was 57.5%, urban population had 64% and rural had 51%. The difference between the urban and rural population was statistically significant (p=0.0001) with urban population having more of anterior crowding. (Table-5)

Table 5: Prevalence of Crowding in college students from urban - rural area.

Crowding	Urban		Rural		P-value
	n	%	n	%	
Present	1189	64	738	51	<0.0001*
Absent	672	56	714	49	

(*P<0.05 significant, CI 0.50 -0.67)

Midline diastema was present 17%, urban had 11%, rural had 23%. The difference between the urban and rural population was statistically significant (p=0.0001) with rural population having more of midline diastema. (Table-6)

Table 6: Prevalence of diastema in college students from urban - rural area.

Diastema	Urban		Rural		P-value
	n	%	n	%	
Present	207	11	334	23	<0.0001*
Absent	1654	89	1118	77	

(*P<0.05 significant, CI 1.96 – 2.89)

8. Discussion

Malocclusion has often been referred to as" disease of civilization" signifying that it is found (or at least reported) primarily in urbanized populations. This call for such studies involving the urban- rural population.

This cross-sectional study aims at finding the percentage of prevalence and type of malocclusion in students of age group 17-23 from urban and rural population in a college in Coimbatore district, Tamil Nadu state, India.

The prevalence of malocclusion in this study was to be around 84% which is in similar finding to by Ojass kumar *et al*. [8] Retna Kumari Narayanan *et al*. [7] Roopa Siddegowda *et al*. [15] Mahajen *et al*. [16].

In the present study prevalence of malocclusion was significant with increased overjet and midline diastema in rural area which is similar to the study conducted by Amit Rekhi *et al*. [19], who stated that rural population had midline diastema of 26.97% and increased overjet.

In the present study crowding was found to be the predominant type of malocclusion in urban population similar to the study conducted by Divakar karanth *et al*. [12] and Ravi Kumar Gudipaneni *et al*. [13].

In the present study class II type of malocclusion to be predominant in urban population similar to the study conducted by Kaur *et al*. [17], Dila Baz Khan *et al*. [18]

The most common type of malocclusion in this study was Angle's class I in both rural and urban population (88% and 82%) followed by crowding (51% and 64%). The least prevalent malocclusion was Angle's class III (3% and 5%). The result of the study regarding the most common type of malocclusion were in agreement with a study carried out by Patoli and Rashid [20] who reported Angle's Class I to be the most prevalent malocclusion (88.8%) followed by crowding (50%). However the result of this study were contradicted by Abu Alhaija *et al*. [21] who reported Angles class II as the most commonly occurring malocclusion.

This study is limited as it has only recorded malocclusion in age group 17-23 years which cannot be generalized to the entire population.

9. Conclusion

Malocclusion is wide spread in population examined at Coimbatore, India. Prevalence of malocclusion was more in rural population when compared with urban population. Crowded incisors were most common feature associated with class I malocclusion. In future further efforts should be made on a larger scale to obtain a base line data to find out the orthodontic treatment need.

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