International Journal of Psychosocial Rehabilitation, Vol. 25, Issue 03, 2021

ISSN: 1475-7192

STATUS OF MALOCCLUSION IN AURANGABAD DISTRICT OF MAHARASHTRA: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: Millions of individuals worldwide are suffering from oro-dental problems in spite most of them being preventable. Malocclusion is one of them. In a diverse and vast country like India, there exists a large variation in prevalence of malocclusion. This can be due to variations in ethnicity, nutritional status, religious beliefs, and dietary habits. To assign a treatment plan and to work out on the treatment needs of a particular group or population, it is mandatory to know the trends of occurrence of malocclusion. As there is a lack of statistical data on malocclusion in this particular geographical area, a study was conducted as suggested by WHO pathfinder methodology on 2400 individuals in Aurangabad district of Maharashtra to identify the distribution of malocclusion.

Methods: A cross-sectional study was conducted among 2400 subjects in Aurangabad district, by Rural Health Training Center, Paithan under Govt Medical College, Aurangabad. The standard pro-forma was designed and house to house survey was conducted. All the findings were recorded in the data sheet after thorough intraoral examination. Descriptive statistical analysis and chi-square test were applied.

Results: Prevalence of Malocclusion was found to be 55.59% in the present study.

Conclusion: The baseline data is essential for planning dental public health programs and /or preventive orthodontic treatment programs. Further studies are encouraged to provide a more comprehensive understanding of the relationship between various sociodemographic factors and malocclusion.

Key words: Malocclusion, Prevalence, Dental disease

Introduction

The oral-facial region is usually an area of significant concern for the individual because it is not only important for interpersonal interactions but also is the primary source of vocal, physical and emotional communication. Adolescent with significant dento-facial discordance suffer from negative self-esteem and social maladjustments. Malocclusion is not a disease but a morphological variation which may or may not be associated with pathological conditions. Malocclusion is defined as an irregularity of the teeth or a mal-relationship between the dental arches beyond the range of what is accepted as normal. It is a multifactorial oral condition caused by general factors such as heredity, congenital defects, nutritional deficiencies and abnormal pressure habits. Malocclusion can also occur due to factors located in the dental arch such as anomalies of tooth size, shape, supernumerary teeth, dental caries and premature loss of primary teeth.[1]

Currently malocclusion is third in the ranking of priorities among the problems of dental public health worldwide, after dental caries and periodontal diseases. It is the second common dental disorder next to dental caries among children and young adults. About 30-40% children suffer from malaligned teeth affecting proper functioning of dentofacial apparatus and aesthetics.[2]

India being a large country with its vast diversity in culture and ethnicity, a definite variation is seen in the prevalence of malocclusion.[2]

To assess the traits of malocclusion in Aurangabad district, a community based cross sectional study was planned in the period of 1993-94.

Materials and Methods:

Study design: It was a community focused, prevalence study.

Study area: Field practice area of Rural Health And Training Center, Paithan of Govt. Medical College, Aurangabad, Maharashtra, India.

Study period: 1st June 1993 to 31st March 1994.

Study population: Aurangabad District was selected for the study because it is a capital place of Marathwada region. Sample selection was done using Pathfinder methodology. For urban population, 4 sites from Aurangabad city; for

Urban III/Semi-urban population, 2 sites from Paithan and 2 sites from Kannad and for rural population 4 villages from Aurangabad city i.e. Phulambri, Kachner, Adul and Hathnoor were selected.

Five index age groups were included: 5-6 years, 12 years, 15-18 years, 35-44 years and above 65 years. As per the standards of pathfinder methodology, there should be the minimum 20 subjects in each cluster. Male: Female ratio was tried to be kept as 1:1. Applying this sampling distribution to the entire population the total sample size of 2400 was selected.

Study tool: The standard pro-forma was designed for malocclusion according to WHO Oral Health Assessment Form (3rd Ed) and pretested on 40 subjects as a pilot trial and continued on entire subjects for data collection.

The following codes were used for recording malocclusion:

0 – No anomaly or malocclusion

1 – Slight anomalies, such as one or more rotated or tilted teeth or slight crowding or spacing, which disturb the regular alignment of the teeth

2 – More serious anomalies, specifically the presence of one or more of the following conditions of the four anterior incisors:

- Maxillary overjet estimated to be 9 mm or more
- Mandibular overjet, anterior cross bite equal to or greater than a full tooth depth
- Open bite
- Midline shift estimated to be more than 4 mm and
- Crowding or spacing estimated to be more than 4 mm

All subjects were examined under proper illumination, on simple bed, table or chair. Following instruments were used for the examination:

1. Mouth Mirror
2. Caries Explorers
3. Periodontal Probe
4. Concentrated sterilized solution.

All the findings were recorded in the datasheet after thorough examination.

Statistical analysis: The data of respondents was collected and compiled. Percentages were calculated. The proportions were compared using Chisquare test and the level of significance was set at $P<0.05$.

Results:

Table 1: Socio-demographic profile of study population

No.	io-demographic profile	an	an III	al	al
	e	33.33)	33.33)	33.33)	)(100)
	ale	33.33)	33.33)	33.33)	)(100)
	l	33.33)	33.33)	33.33)	)(100)
		33.33)	33.33)	33.33)	100)
		33.33)	33.33)	33.33)	100)
	8	33.33)	33.33)	33.33)	100)
	4	33.33)	33.33)	33.33)	100)
		33.33)	33.33)	33.33)	100)
	l	33.33)	33.33)	33.33)	)(100)
	gion				
	lu	30.90)	32.767)	36.328)	5(100)
	lim	34.574)	34.840)	30.585)	100)
	dhist	53.266)	5.678)	1.055)	100)
	l	(33.33)	33.33)	33.33)	)(100)
	acy status				
	rate	7.002)	31.454)	41.543)	100)
	ate	57.560)	7.804**)**	4.634)	100)
	ary school	39.545)	33.181)	27.272)	100)
	dle school	22.756)	33.173)	44.070)	100)
	school	1.188)	7.722)	1.089)	100)
	mediate or post high school ficate	9.602)	44.043)	6.353)	100)
	luate and Above	5.263)	4.737)	0)	00)
	l	33.33)	33.33)	33.33)	)(100)
	upation				
	ent	40.55)	31.443)	28.007)	4(100)
	ndent	1.927)	42.525)	35.548)	100)
	sewife	5.186)	39.255)	45.559)	100)
	cultural labour	0)	8.333)	1.667)	100)
	business	7.186)	2.663)	0.151)	100)
	rs	0.351)	7.544)	2.105)	00)
	loyed	4.667)	8.667)	6.667)	100)
	l	33.33)	33.33)	33.33)	)(100)
	o-economic status				
	s I	42.083)	52.5)	.417)	100)
	s II	35.516)	30.556)	33.929)	3(100)
	s III	20.685)	16.964)	62.351)	100)
	l	33.33)	33.33)	33.33)	)(100)

From the above **Table 1**, it is clear that equal no. of subjects were taken from each study area i.e. 800 (33.333%). Of the total 2400 subjects, 20% were examined from each index age group with equal proportion of male and female i.e. 50%

each. Maximum No. of subjects were from Hindu (76.04%), Muslim (15.66%) and Budhist (8.2%). Cosidering the literacy status, highest percentage of primary and middle school (27.5%,) and higher percentage of population of primary school (27.5% and 26%) and lowest percentage of graduates and above were found (2.37). Occupationwise, out of the total 2400 subjects maximum were students (48.58%), housewife (29.08%) and dependent (12.54%). Socioeconomic status revealed maximum no.of subjects were from class I and II (72%) followed by class III (27.9%).

Table 2: Association between geographic location and mal-occlusion of study population

o	graphic Location	-occlusion			l	lue
	an I	60.5)	32.125)	.375)	100)	168.342 001
	an III	43.875)	42.625)	13.5)	100)	
	l	28.875)	58.125)	13)	100)	
	l	6(44.417)	3(44.292)	11.292)	)(100)	

It was seen from **Table 2** that the prevalence of malocclusion according to study area exhibited highest prevalence of malocclusion in rural area 71.12% (58.12% mild, 13.0% moderate to severe malocclusion); Urban III area revealed 56.125% (42.62% mild, 13.5% moderate to severe malocclusion) whereas Urban I area revealed 39.49% (32.12% mild and 7.37% moderate to severe malocclusion).

Table 3: Association between socio-demographic profile and malocclusion of study population

ho	io-demographic Profile	l-occlusion			al	alue
	le	(46.917)	(43.917)	)(9.167)	)0(100)	= 13.051 0.00146559 .05
	nale	(41.917)	6(44.667)	(13.417)	)0(100)	
	al	6(44.417)	3(44.292)	(11.292)	)0(100)	
		)(50)	(38.542)	11.458)	)(100)	= 121.28 .001
		(32.5)	(46.458)	(21.042)	)(100)	
	18	(40)	)(52.083)	7.917)	)(100)	
	44	)(41.667)	(50.208)	8.125)	)(100)	
		(57.917)	(34.167)	7.917)	)(100)	
	al	6(44.417)	3(44.292)	(11.292)	)0(100)	
	igion					
	du	(43.178)	(46.411)	)(10.411)	5(100)	= 37.701 .05
	slim	(49.468)	(32.447)	18.085)	(100)	
	dhist	46.231)	47.236)	6.533)	)(100)	
	al	6(44.417)	3(44.292)	(11.292)	)0(100)	
	eracy status					
	erate	(46.291)	(45.697)	8.012)	(100)	= 90.293 .001
	rate	47.805)	46.829)	5.366)	(100)	

	mary school	(50.909)	(38.939)	10.152)	)(100)	
	ldle school	)(35.256)	)(46.314)	(18.429)	(100)	
	n school	.(54.950)	37.129)	7.921)	(100)	
	ermediate or post high ool certificate	34.296)	(55.957)	9.747)	(100)	
	duate and above	52.632)	38.947)	.421)	100)	
	al	6(44.417)	3(44.292)	.(11.292)	0(100)	
	cupation					
	dent	(40.808)	.(43.900)	(15.292)	4(100)	= 140.897
	pendent	.(66.777)	26.578)	6.645)	.(100)	.001
	usewife	.(40.401)	(48.138)	11.461)	)(100)	
	icultural labour	30.000)	(63.889)	6.111)	)(100)	
	n business	47.739)	45.226)	7.035)	)(100)	
	ers	68.421)	28.070)	.509)	100)	
	ployed	40.667)	55.333)	.000)	)(100)	
	al	6(44.417)	3(44.292)	.(11.292)	0(100)	
	io-economic status					
	ss I	(55.833)	(35.000)	9.167)	)(100)	= 61.011
	ss II	.(37.798)	)(48.512)	(13.690)	8(100)	.001
	ss III	(42.113)	(47.917)	9.970)	(100)	
	al	6(44.417)	3(44.292)	.(11.292)	0(100)	
	bit					
	ger Cleaning	)(43.501)	(42.975)	)(13.524)	1(100)	= 154.662
	sh Cleaning	.(46.685)	(44.006)	9.309)	)(100)	.001
	*	(41.221)	(51.527)	7.252)	(100)	
	**	48.980)	44.898)	.122)	100)	
	al	6(44.417)	3(44.292)	.(11.292)	0(100)	

As **Table 3** shows that sex wise prevalence of malocclusion was found to be 53.08% in males and 58.08% in females. Age wise prevalence was found be highest in 15-18 years age group (60 %) and lowest in 65+ years age group (42.084%) and in 5-6 years age group (50%). In case of religion, Hindus exhibited highest prevalence of malocclusion (56.52%) and Muslims lowest prevalence (50.532%). Literacy status revealed maximum prevalence in intermediate or post high school certificate group (65.70%). Among different occupations, agricultural labours exhibited highest (70%) prevalence. Considering the socioeconomic status prevalence of malocclusion was found to be highest in class II and Class III groups i.e. 62.20% and 57.88% respectively. Considering the teeth cleansing habit and tobacco and betel nut chewing habit, prevalence of severe malocclusion was found to be higher in individuals using fingers for teeth cleansing (13.52%).

It was observed that statistically significant difference in prevalence was seen in all sociodemographic factors i.e. study area or geographic location, sex, religion, different age groups, literacy status, occupation and socio-economic status and habits.

Discussion

There is a wide variation in the prevalence of mal-occlusion by different studies. The variations in these studies could be seen at every level, ranging from sample selection criteria of the traits of mal-occlusion to analysis methodology[3]. The major factor which would have influenced, the prevalence rate were lack of uniform objective criteria, in recording mal-occlusions traits and the reliability of consistency in making observations by the same as well as different field workers. There are socio-demographic variations in the expression of malocclusion which may be an indirect reflection of

nutritional status and the dietary habit, lack of reliable and valid indices and absence of any standardization of reporting which in the past have prevented any meaningful comparison between various surveys.[3]

Results of the present study revealed that 44.41% had no malocclusion whereas 44.29% exhibited slight and 11.29% had moderate to severe mal- occlusion. Shourie (1942) was first to report on prevalence of mal -occlusion as almost 50%.[4] Prasad and savadi (1970-80) reported the prevalence of mal-occlusions 51.5% in Banglore city.[5] Kharbanda et al (1991) conducted study in Delhi and found the prevalence of mal-occlusion as 36.6% of these 16.9% had mild whereas 19.6% moderate to severe mal-occlusion.[6] Nunn et al, found 77% adults had no, 17% had mild and 6% had moderate to severe mal-occlusion.[7]

Prevalence of severe mal-occlusion was higher in urban III (13.5%) followed by rural (13%) and lowest was in urban I (7.37%). Prevalence of slight mal-occlusion was higher in rural area (58.12%) followed by urban III (42.62) and lowest was in urban I (32.12%). Different prevalence rate of mal-occlusion in India has been reported 50% in Punjab, 28.8% in Udupi, 45 -44.97% Trivandrum, 51.5% in Banglore, and 90% in Delhi.[8,9,10] Jalili et al conducted a study on 1085 tribal children of 6-12 years of age living in remote village of Mandu in district Dhan of Madhya Pradesh.[11] The Tribal children exhibited a very low prevalence of mal-occlusion and its traits as compared to the urban Indian children.[12] The Prevalence of mal-occlusion was (14.4%) and majority of them (10.5%) were of mild mal-occlusion. Though it is said that prevalence of mal-occlusion is high in urban than in rural but in our present study, prevalence of severe mal-occlusion as well as slight mal-occlusion is lower in urban I than in Urban III and rural.

Genderwise prevalence of malocclusion was found to be 53.08% in males and 58.08% in females. Age wise prevalence was found be highest in a 15-18 years age group i.e. 60 % and lowest in 65+ years age group i.e. 42.084% and in 5-6 years age group i.e. 50%. Severe malocclusion was found to be highest in 12 years age group i.e. 21.042% whereas slight malocclusion was highest in 15-18 years age group i.e. 52.083%. Prasad and Savadi (1970-80) reported higher prevalence of malocclusion in female (60%) as compared to male (43%).[5] They also reported among all the age group, the highest prevalence of mal-occlusion was (85.7%) among females of 13 years, and 66% among the boys of 15 years. Ann Holmes in his study found that, sexwise distribution showed significantly higher percentage of female categorized in grade I and 2, 38.5% compared with only 31.4% of males, conversely there was much lower percentage of female 27.7% compared with 36.0% of males in the grades 4 and 5, those who in need of great or very urgent treatment need.[13]

Ethnic group wise distribution of severe mal-occlusion showed higher prevalence among Muslim (18.08%) followed by Hindu (10.41%) and Buddhist (6.53%). Slight mal-occlusion was higher among Buddhist (47.23%) followed by Hindu (46.41%) and lowest in Muslim (32.44%). There is an ethnic factor producing variations in the prevalence of mal-occlusion i.e. more whites are known to have mal-occlusion than blacks. An epidemiologic study (1980) of incidence of mal-occlusion in black Americans and in Nyeri Kikuyu, Kenyans had shown that out of the 445 black Americans, 71% had class I mal-occlusion, class II (16%) and class III (8.7%). The Kenyan sample included of the 505, class I mal-occlusion was found in 78.5%, class II in 7.9% and class III was higher in Kenyans than in other, black sample reported with 16.8%.[14] Lau J also suggested difference in patterns of malocclusion in different ethnic groups.[15]

Literacy status distribution of severe malocclusion showed higher prevalence among population of Middle school (18.42%) and lowest was among literates (5.36%). Distribution of slight malocclusion showed higher prevalence among intermediate or post highschool certificate group i.e. 55.95%. Pratelli P et al revealed the impact of patient and parental educational status towards malocclusion and orthodontic care.[16]

Distribution of severe mal-occlusion according to occupation showed higher prevalence among student (15.29%) and lowest among others (3.50%). Slight mal-occlusion showed high prevalence among agricultural labour (63.88%) and lowest among dependent and other (26.57% and 28.07%) respectively. Tuominen M et al have shown the occupational influence on malocclusion and orthodontic concerns.[17]

Distribution of subject as per socio-economic classification showed, prevalence of severe mal-occlusion higher among class II population (13.69%) followed by class III (9.97%) and class I (9.16%). Distribution of subject showed, prevalence of slight mal-occlusion among class II (48.51%) followed by class III (47.91%) and lowest among class I (35%). Though it is said that prevalence of mal- occlusion in developed countries is higher than in third world countries, we have found class I communities has less prevalence of mal-occasion than class II and III. Literature has revealed that the parent's occupation, directly or indirectly, influences child's oral health.[18] Tickle M concluded in their studies that socioeconomic status affects normatively measured orthodontic treatment need.[19] Esa et al in 2001 also found difference in malooclusion patterns in different occupational subjects.[20]

Considering the teeth cleansing habit and tobacco and betel nut chewing habit, prevalence of severe malocclusion was found to be higher in individuals using fingers for teeth cleansing i.e. 13.52% and prevalence of slight malocclusion was found to be higher in individuals having finger cleaning and tobacco chewing habits i.e. 51.52%. This could be attributed to extra pressure on teeth exerted by finger and constant friction exerted during tobacco chewing. Also tobacco chewing increases risk for periodontal disease and dental caries leading to tooth loss and subsequent malocclusion.[21]

Conclusion

Malocclusion is one of the major dental problems affecting the population. People are unaware of its consequences and preventive and treatment modalities.

The baseline data is essential for planning dental public health programs and /or preventive orthodontic treatment programs. Further studies are encouraged to provide a more comprehensive understanding of the relationship between various sociodemographic factors and malocclusion.

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