**PREVALENCE OF MALOCCLUSION AND ITS RELATIONSHIP WITH SOCIO-DEMOGRAPHIC FACTORS, DENTAL CARIES AND ORAL HYGIENE STATUS IN 12-15 YEARS OLD SCHOOL CHILDREN OF LUCKNOW CITY**

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**Abstract**

**Objective-** To assess the prevalence of malocclusion and its relationship with socio-demographic factors, dental caries and oral hygiene status in 12-15 years old school children in Lucknow city.

**Material and Methods:** A descriptive cross-sectional study was conducted in 12-15 years school children with the sample of 851 students. Information was collected regarding socio-demographic factors, dental caries (WHO Oral Assessment Form 2013), OHI status and Dental Aesthetic Index (WHO Oral Assessment Form 1997) to evaluate the relationship related to malocclusion.

**Results:** Among 851 students, 403 were males and 448 were females. The prevalence of malocclusion (DAI >25) among the study population was 23.1%. A statistically significant relationship was found between malocclusion was age, socioeconomic status, dental caries and Oral Hygiene Index.

**Keywords:** malocclusion, school children, socio-demographic factors, dental caries,

 OHI.

**Introduction:** A malocclusion is a misalignment or incorrect relation between the teeth of the two [dental arches](https://en.wikipedia.org/wiki/Dental_arch) when they approach each other as the [jaws](https://en.wikipedia.org/wiki/Jaw) close. **Frances C Macgregor 1969** stated that “a disfiguring malocclusion is a physical handicap since it limits a person’s social stereotype and opportunities”1.

 Malocclusion is one of the most common dental problems in mankind. Malocclusion may not be life-threatening, but it’s an important public health issue as it comprises the health of oral tissues which can lead to psychological and social problems.1-3

The prevalence of malocclusion in developing countries has been the dispute for many years. According to literature, different authors **(Sharma A *et al.* 2015, Tak *et al*. 2013, Gupta R *et al*. 2015)** have evaluated and reported the prevalence of malocclusion to be 23.1%, 33.3% and 21.5% respectively.1,2,3,5 This can be due to change in food habits, increase in dental caries and other associated factors. If malocclusion not diagnosed at an early stage and appropriate preventive measures are not implemented, it might progress to severe form of malocclusion which can lead to more time- consuming, expensive and complicated orthodontic treatment.

 Oral hygiene is also one of the important etiological factors, which result in dental diseases such as dental caries and periodontitis. Children finds difficulty in maintaining good oral hygiene which results in the increase of plaque accumulation on the teeth surfaces and hence more susceptible to caries development.5 Dental Caries is considered to be a predisposing factor for occlusal anomalies.5-7

 In developing countries, socio-demographic background is also another relevant etiological factor that determines the need for treatment of malocclusion. According to **Siddegowda R *et al* 2013**6 reported that children with high Socio Economic Status could easily afford for orthodontic treatment than when compared to children from low and middle SES. But trend has changed now which may be due to increase in literacy rate and better job opportunities which would have people to lead a better life and meet their basic requirements.6,8,9

 Although there is relevant data regarding the prevalence of malocclusion in 12-15 years school children in Lucknow but relationship between socio-demographic factors, dental caries and oral hygiene status is scarce.

 Therefore, the present cross-sectional study was undertaken with an attempt to assess the malocclusion prevalence and relationship of malocclusion with socio-demographic factors, dental caries and oral hygiene among 12-15 years school going children of Lucknow city.

**Material and Methods**

 A descriptive cross-sectional study was designed in 12-15 years school children for the period of 7 months i.e. from January to July 2017. A written consent was obtained from school authority and informed consent was obtained from the guardians for the examination of their children. An approval was taken from Institutional ethical Committee.

 The pilot study was conducted on 50 children aged 12-15 years school children to assess the operational feasibility and reliability of the study. The calculation of sample size was performed to seek the results at 95% confidence level. The allowable error taken was e = 0.05. So, the sample size was estimated to be 851. The results of the examinations were compared in order to obtain an estimate of extent and nature of diagnostic variability measured by kappa statistics. The kappa statistics for intra-examiner reliability was estimated was estimated to be 0.86, 0.81 and 0.89 for OHI-S, Dental caries and Malocclusion respectively.

 The sample was selected by multistage cluster random sampling technique. In the first stage, Lucknow city was divided geographically into 4 areas i.e. East, West, North and South. In the second stage, one ward was randomly selected from each of these geographic areas. List of all wards from the 5 geographic areas was obtained from Census Enumeration Areas Data (2011). In the third stage, two schools (1 public and 1 private) from the list of District School Officer were selected randomly. Students aged 12-15 years on the day of examination were included in the study while students undergoing orthodontics treatment, physically handicapped or those who do not gave consent were excluded.

 The study proforma consisted of 3 parts- First part consisted of a pre-designed questionnaire. First section includes demographic details like name, age, gender, address from the student and type of school (Govt. or private). In the second section, the socio-economic status (Kuppuswamy socio-economic status scale, 2014) was elicited by the parents who were invited on the day of examination. This scale takes into account education, occupation and income of the family to categorize families into class I (upper class), class II (upper middle), class III (middle class), class IV (lower middle) and class V (lower class). The second part consisted of oral examination including Oral Hygiene Index-Simplified (OHI-S)13 (by John C. Greene and Jack R. Vermillion, 1964), Dentition Status (WHO Oral Health Assessment Form, 2013)12 and Dentofacial anomalies was recorded using Dental Aesthetic Index (WHO Oral Health Assessment Form, 1997)8 which provide information on occlusal status.

Each subject was examined (ADA Type III Examination) by the examiner with sterile instruments under natural light.

 A single examiner interviewed and examined the children. The examiner visited the selected private and public schools on the scheduled dates with one recording assistant. The children were allowed to sit comfortably on a chair and a table to place instruments was placed within the easy reach of the examiner. The recording assistant was allowed to sit close enough to the examiner, so that instructions and codes could be easily heard and the examiner could see that findings were being recorded correctly. Detailed oral examination was conducted using sterile instruments. All the subjects were made to sit in a chair under natural light for examination (ADA Type III).

 The data collected was entered in Microsoft Excel 2013 spreadsheet and then checked for any missing entries and statistically analysed using Statistical Package for Social Science (SPSS) version 21.0 (SPSS Inc., Chicago, IL, USA). The data collected was coded and tabulated and subjected to appropriate analysis. Inferential statistics were performed using parametric tests of significance as well as Chi-square test. Multiple Linear Regression analysis was used to test the significance of the association of malocclusion with socio-demographic details, oral hygiene status and dental caries. **The level of significance was to be p<0.05.**

**Results**

Among the 851 students who were examined, , 403 (47.4%) were male and 448 (52.6%) were females. Furthermore, 224 (26.3%) were 12 years aged, 200 (23.5%) were 13 years aged, 201 (23.6%) were 14 years aged and 226 (26.6%) were 15 years aged. According to the type of school, 429 (50.4%) children studied at private schools while 422 (49.6%) children were enrolled in public schools.

Regarding socio-economic status, majority of students belonged to the middle class (upper-middle; 421: 49.5% and lower middle; 206: 24.2%) family followed by the children who belonged to upper class family i.e. 102 (12%). The remaining children belonged to lower class i.e. (lower middle; 206: 24.2%) and 29 (3.4%) belonged to lower class family. **(Table 1)**

**Fig. 1** showed the prevalence of malocclusion according to Dental Aesthetic Index. The results of the study showed that the prevalence of malocclusion in 12-15 years school going children was 23.1% (definite/severe/handicapped).

**Table 2** depicts the relationship between DAI with socio-demographic characteristics, dental caries and OHI of children enrolled (n=119). It is observed that there is a positive relationship between age, socio-economic status, Dental Caries and Oral Hygiene Index.

**Table 1: Socio-demographic characteristics of children enrolled (n=851)**

|  |  |  |
| --- | --- | --- |
| **Socio-demographic characteristics** | **Number** | **Percentage** |
| **Age (yrs):** **12** **13** **14** **15** | 224200201226 | 26.323.523.626.6 |
| **Gender:** **Male** **Female**  | 403448 | 47.452.6 |
| **Type of school:** **Private** **Government** | 429422 | 50.449.6 |
| **Socio-economic status:** **Upper class** **Upper middle** **Lower middle** **Upper lower** **Lower** | 1024212069329 | 12.049.524.210.93.4 |

**Fig 2: Distribution of study population according to Dental Aesthetic Index (DAI) scores**

**Table 2: Relationship between malocclusion and socio-demographic characteristics, dental caries and OHI of children enrolled (n=119)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Malocclusion** | **χ2 value** | **p** **value** |
| **Normal/Little** **(n=654) (%)** | **Definite** **(n=116) (%)** | **Severe (n=69) (%)** | **Handicapped** **(n=12) (%)** |
| **Age (yrs):** **12** **13** **14** **15** | 176 (26.9)160 (24.5)144 (22.0)174 (26.6) | 20 (17.2)24 (20.7)41 (35.3)31 (26.7) | 25 (36.2)14 (20.3)15 (21.7)15 (21.7) | 3 (25.0)2 (16.7)1 (8.3)6 (50.0) | 19.33 | 0.023 |
| **Gender:** **Male** **Female**  | 311 (47.6)343 (52.4) | 55 (47.4)61 (52.6) | 31 (44.9)38 (55.1) | 6 (50.0)6 (50.0) | 0.21 | 0.976 |
| **Type of school:** **Private** **Government** | 337 (51.5)317 (48.5) | 58 (50.0)58 (50.0) | 27 (39.1)42 (60.9) | 7 (58.3)5 (41.7) | 4.15 | 0.246 |
| **SES:** **Upper class** **Upper middle** **Lower middle** **Upper lower** **Lower** | 86 (13.1)333 (50.9)161 (24.6)61 (9.3)13 (2.0) | 10 (8.6)47 (40.5)29 (25.0)20 (17.2)10 (8.6) | 5 (7.2)31 (44.9)16 (23.2)11 (15.9)6 (8.7) | 1 (8.3)10 (83.3)0 (0.0)1 (8.3)0 (0.0) | 38.11 | <0.001 |
| **Oral hygiene index:** **Good** **Fair** **Poor** | 428 (65.4)191 (29.2)35 (5.4) | 46 (39.7)44 (37.9)26 (22.4) | 12 (17.4)31 (44.9)26 (37.7) | 2 (16.7)6 (50.0)4 (33.3) | 129.28 | <0.001 |
|  **No caries** **Decayed teeth** **Filled teeth** **Missing teeth** | 476 (72.8)167 (25.5)8 (1.2)3 (0.5) | 31 (26.7)71 (61.2)8 (6.9)6 (5.2) | 15 (21.7)43 (62.3)0 (0.0)11 (15.9) | 4 (33.3)6 (50.0)0 (0.0)2 (16.7) | 201.81 | <0.001 |

**Discussion**

Malocclusion is one of the most prevalent dental problems in children. It is a multi-dimensional problem which can cause disturbances of oral function such as mastication, swallowing and speech and psychological problems related to impaired dentofacial aesthetics.1-2 Malocclusion has a large impact on both, individuals and society in terms of discomfort, quality of life, social and functional limitations.3 Dental caries and poor oral hygiene status are the major complications of malocclusion.5-7 Therefore, a descriptive cross-sectional survey was designed to assess the prevalence of malocclusion and its relationship with socio-demographic factors, dental caries and oral hygiene status in 12-15 years school going children in Lucknow city. In the present study, children aged 12-15 years school going children were included. Similar age groups have previously been used in studies by **Tak M *et. al*(2013)2*,* Gaikwad SS *et. al* (2014)5*,* Sharma A *et. al* (2015)14** **and Damle D *et. al* (2015)15** where they have assessed the same age group for assessing the malocclusion. There were 47.4% (403) males and 52.6% (448) females. Almost similar higher proportions of female were also reported by **Shivakumar KM *et. al* (2010)16 (50.1%: 49.9%)**, **Gusmao ES *et. al* (2011)17 (60%: 40%)** and **Nalcaci R *et. al* (2012)18 (54%: 46%)** as females are more concerned for their dental appearance than males.

The socio-economic status was construed using Kuppuswamy’s socio-economic status scale, 2014, wherein the education and occupation of the child’s father or guardian along with the total family income was recorded Kuppuswamy’s SES scale has been employed previously by **Pruneda JFM *et. al* (2012)19** in order to find prevalence of malocclusion and its association with age, sex and socioeconomic status. In the present study also maximum children belonged to the middle class which is similar to the study done by **Pruneda JFM *et. al* (2012)19.**

In the present study the mean DAI score of the children was 23.1% among 12-15 years school children. A higher mean DAI score was observed in the studies of **Raina R *et. al* (2017)51, Tak M *et. al* (2013)2** and **Sharma A *et. al* (2015)1** of 24.8%, 33.3%, and 33.1% respectively. A relatively low DAI score was observed in the studies of **Gupta R *et. al* (2015)3, Sushanth VH *et. al* (2015)21, Ahammad ARY *et. al* (2013)34** of 21.5%, 21.1% and 16.4% respectively. *The variation of DAI scores may be related to different cross cultural differences, variation in growth, facial skeleton development, occlusion and genetic predisposition.*

In the present study a statistically significant association was found between malocclusion and oral hygiene index. An increase in DAI overall score was observed with increase in OHI-Simplified scores. The result was in accordance with the study done by **Arora G *et. al* (2015)17, Ashley FP *et. al* (1998)9** and **Gusmao ES *et. al* (2011)40** *in which poor oral hygiene was found to have a plausible link to malocclusion, as poor oral hygiene is associated with several factors such as poor tooth positioning, bacterial plaque is retained and accumulates and therefore, proliferates and leads to periodontal diseases*. In the study conducted in Tanzania, **Mtaya M A *et. al* (2015)22**, and the study conducted in Pakistan, **Abbas A *et. al* (2015)15** found that it is a non-significant factor for malocclusion.

**Recommendations**

Parents, teachers, students and all other relevant school personnel should be encouraged to participate in regular oral health education programmes where the public health dentists should educate them about the value of oral health and essential oral health practices at home.

**Conclusion**

The prevalence of malocclusion among the study population was 23.1%. There was a positive relationship between malocclusion with age, socio-economic status, dental caries and oral hygiene status. We can conclude that school population was the responsibility of the parents, guardians and teachers to mould child’s mental attitude in such a way that he/she develops a positive outlook towards health/oral health, adheres good lifestyle and maintain a healthy relationship.

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