International Journal of Dentistry and Oral Science (IJDOS)
ISSN: 2377-8075

Prevalence Of Dental Malocclusion And Orthodontic Treatment Needs Among Patients Visiting Private Dental College - A Retrospective Study

Research Article

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Abstract

Prevalence of malocclusion can be studied by using indexes such as Index of Orthodontic Treatment Need (IOTN), Dental Aesthetics Index (DAI), Handicapping Labio-Lingual Deviation Index and Index of Complexity, Outcome, and Need (ICON). Dental Aesthetic Index is an orthodontic index based on socially defined aesthetic standards to determine the severity and treatment needs of malocclusion which can be used to determine the distribution of malocclusion in the study population as there is sparse reports on it while also help in orthodontic treatment planning. This study was to determine the prevalence of dental malocclusion using the dental aesthetic index (DAI). A retrospective study was conducted using case records of patients from university hospital settings. About 65 case records of patients aged above 18 years with recorded dental aesthetic index were retrieved and data was analysed using SPSS software. The results showed that out of the total study population, 72.31% of them had minor malocclusion and needed slight orthodontic treatment, 13.85% had definite malocclusion and needed elective treatment, 9.23% had severe malocclusion and needed desirable orthodontic treatment and 4.62% had handicapping malocclusion and needed mandatory orthodontic treatment. No significant association between age, gender with severity of malocclusion and orthodontic treatment needs. Within the limitations of the present study, the age group 18-25 years females had severe handicapping malocclusion and needed mandatory orthodontic treatment compared to males.

Keywords: Prevalence; Malocclusion; Dental Aesthetic Index; Orthodontic.

Introduction

Malocclusion is a problem affecting the teeth where there is misalignment or incorrect relation between teeth in the dental arches , which can be inter arch or intra arch. Most commonly seen dental malocclusion are crowding, overbite, underbite, open bite, cross bite, malocclusion of the antero-posterior plane which are Class II and III, and skeletal malocclusion. These are the most commonly occurring deviations of the teeth from the ideal occlusion. Malocclusion is usually an inherited condition but sometimes may manifest as consequences to oral habits such as thumb sucking or mouth breathing that leads to imbalance of force acting on the teeth causing malocclusion. It can be even due to trauma in a few isolated cases. Malocclusion has been identified as the third most common dental health problem, following dental caries and periodontal disease with a global prevalence that varies from 20 to 88 percent. A study conducted in Rajasthan, India reported prevalence rate of 36.42 percent and another in the state of Tamil Nadu, India showed a prevalence rate of 15 percent [1, 2]. In Himachal Pradesh, India, Chauhan D et al., [3] reported that 3.1% of the children had malocclusion and in Davangere, Karnataka, 15.7% of the study population had definite malocclusion, 3.7% had severe malocclusion and 0.5% had handicapping malocclusion. Suma et al., [4] reported that urban children in Nalgonda district of Andhra Pradesh had 20.8% prevalence rate compared to rural childrens who had prevalence rate of 14.9% [5]. A study done in Chhattisgarh, India reported that 33.2% of the participants did not have malocclusion or minor malocclusion and in

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Received: May 28, 2021
Accepted: June 16, 2021
Published: July 07, 2021

Citation: Thiviya Raaj, Arthi Balasubramaniam, Sri Sakthi D. Prevalence Of Dental Malocclusion And Orthodontic Treatment Needs Among Patients Visiting Private Dental College - A Retrospective Study. *Int J Dentistry Oral Sci.* 2021;8(7):3129-3134. doi: http://dx.doi.org/10.19070/2377-8075-21000637

Maharashtra, reports observed spacing in 40.36%, deep bite in 38.08%, crowding in 31.88%, rotation in 15.36%, cross bite in 5.5% and open bite in 2.98% of school children [6, 7]. Malocclusion is a serious health problem as the teeth are unable to perform vital functions due to the misalignment and has been proven to be a predisposing factor for several major dental problems.

Dental Aesthetics Index (DAI) is an orthodontic index based on socially defined aesthetic standards. This index was introduced by Cons et al. [8] back in 1986 to determine the severity and treatment need of malocclusion. Though many indices are available, Dental Aesthetic Index have been used in many studies [9]. An ideal index requires it to be valid and reliable, also not forgetting simple and easily applied. The dental aesthetic index was proven to fulfill all those requirements and thus, the World Health Organization (WHO) made it a cross-cultural index [10]. The dental aesthetic index scores are divided into 4 levels. They are scored based on the severity of malocclusion. The scores are ; score lower than or equal to 25 which indicates no or slight treatment need, score between 26 and 30 requiring elective treatment, score between 31 and 35 indicating high need for treatment, and score greater than 36 requiring mandatory treatment [8]. Dental Aesthetic Index can be a key diagnostic index as it would aid the dentist to determine the malocclusion severity and decide if treatment is needed as it could save cost for patients with low socioeconomic status who would find a costly treatment unnecessary if it does not inhibit their daily function. Previously our team has a rich experience in working on various research projects across multiple disciplines [11-25]. This study was aimed to determine the prevalence of malocclusion and orthodontic treatment needs using the dental aesthetic index (DAI).

Materials And Methods

Study Setting and Design

A retrospective study was conducted using the records of patients visiting the author's University hospital. This study was done by reviewing 86,000 patient records of nine months from June 2019 to March 2020.

Ethical Approval

Ethical approval for this study was granted by the Institutional Review Board (IRB). The ethical ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320.

Selection Criteria

A total of 2167 case records diagnosed with malocclusion were sorted. Of which patients record containing information on malocclusion graded by Dental Aesthetic Index (DAI) was retrieved. About 65 patient records with age ranging from 18 years to 40 years were retrieved. No gender restriction placed. An effort was taken to remove the duplicates and incomplete records with the help of an external reviewer.

Data Collection

Information on grading of malocclusion using Dental Aesthetic Index developed by Naham C. Cons, Joanna Jenny and Frank J. Kohout in 1986 to assess orthodontic treatment needs was collected. Patients' age and gender were recorded in the separate spreadsheet. Intra oral photographs of selected subjects were assessed for cross verification. The information on DAI was recorded by the trained examiner. Age of the patients was categorized as 18-25 years, 26-32 years and 33-40 years for

Statistical Analysis

Collected data was entered in the Microsoft Excel Sheet version 8.1 and the data was imported to Statistical Package for Social Sciences (SPSS) software version 23.0. Descriptive statistics and chi-square tests were done to present the prevalence and association respectively.

Results

Most of the patients (53.85%) included in the study were in the age group 18-25 years, followed by 26-32 years (33.85%) and 33-40 years (12.31%) shown in Figure 1. About 67.7% of the patients were males and 33.31% were females shown in Figure 2. Among the patients 72.31% of them had minor malocclusion, 13.85% had definite malocclusion, 9.23% had severe malocclusion and 4.615% had handicapping malocclusion as shown in Figure 3. Similarly, 72.31% of them needed for slight treatment, 13.85% needed for elective treatment, 9.23% needed for desirable orthodontic treatment and 4.615% needed for mandatory orthodontic treatment as shown in Figure 4.

Among the patients, 62.86%, 81.82% and 87.5% of the age group 18-25 years, 26-32 years, 33-40 years had slight malocclusion. About 20% and 9.091% of patients in the age group 18-25 years and 26-32 years had definite malocclusion. Also 11.43%, 4.545%

Figure 1: Bar chart showing distribution of age of the study participants. X axis represents the age groups in years, and Y axis represents the percentage of patients. Most of the study participants (53.85%) (blue) were at the age group 18-25 years.

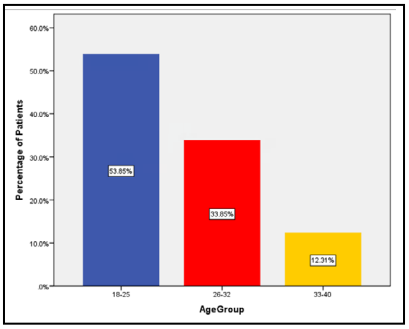


Figure 2: Bar chart showing the distribution of gender among study participants. X axis represents gender, and Y axis represents percentage of patients. Males (67.7%) (blue) predominated the study population.

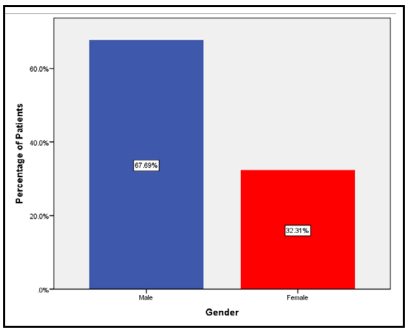


Figure 3: Bar chart showing the distribution of severity of malocclusion among the patients. X axis represents the scores of Dental aesthetic index, and Y axis represents the percentage of patients. 72.31% (blue) of the patients had a score of less than 25 of DAI, which indicates minor malocclusion, followed by 13.85% (red) with definite malocclusion, 9.23% with severe malocclusion (green) and 4.615% (yellow) with handicapping malocclusion.

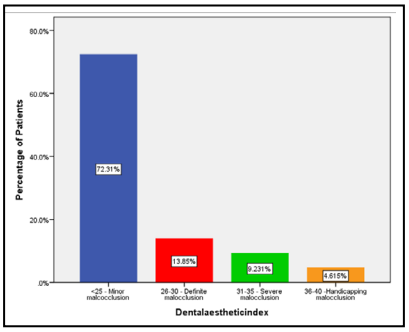


Figure 4: Bar chart showing distribution of orthodontic treatment needs among the patients. X axis represents the treatment needs, and Y axis represents the percentage of patients. About 72.31% of patients need slight orthodontic treatment (blue), followed by elective treatment (13.85%) (red), treatment highly desirable (9.23%) (green) and mandatory orthodontic treatment (4.615%) (Yellow).

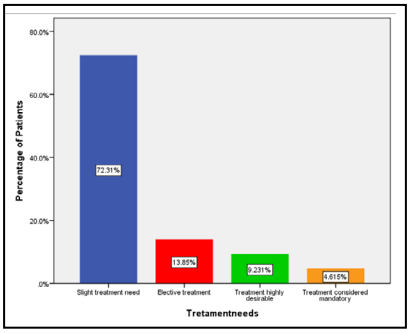
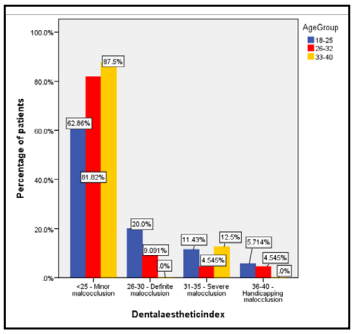


Figure 5: Cluster bar chart showing association of age and severity of malocclusion. X axis represents the scores of dental esthetic index (DAI) and Y axis represents the number of patients. Chi-square test was done and found to be statistically not significant (Chi-square value = 4.647 p value = 0.590). Most of the patients in all groups had minor malocclusion (score <25), followed by definite malocclusion (score 26-30), severe malocclusion (31-35) and handicapping malocclusion (>36).



and 12.5% of patients in the age group 18-25 years and 26-32 years, 33-40 years had severe malocclusion respectively. About 5.714% and 5.454% of patients in the age group 18-25 years and 26-32 years had handicapping malocclusion respectively as shown in Figure 5. In Figure 6, about 79.55% males and 57.14% females had minor malocclusion, 9.091% and 23.81% of male and female patients had definite malocclusion, also 9.091% and 9.524% males and females had severe malocclusion and about 2.273% and 9.524% male and female patients had handicapping malocclusion.

Among the patients, 62.86%, 81.82% and 87.5% of the age group 18-25 years, 26-32 years and 33-40 years needed slight orthodontic treatment. About 20% and 9.091% of patients of the age group 18-25 years and 26-32 years needed elective orthodontic treatment. Also 11.43%, 4.545% and 12.5% of patients in the age group 18-25 years and 26-32 years, 33-40 years needed highly desirable orthodontic treatment. About 5.714% and 5.454% of patients in the age group 18-25 years and 26-32 years needed

Figure 6: Cluster bar chart showing association of gender with severity of malocclusion. X axis represents scores of dental esthetic index (DAI) and Y axis represents number of patients. Chi-square test was done and found to be statistically not significant (Chi-square value = 4.833; p value = 0.184). Most of the males (blue) had minor malocclusion. However, females had high prevalence of definite malocclusion and handicapping malocclusion.

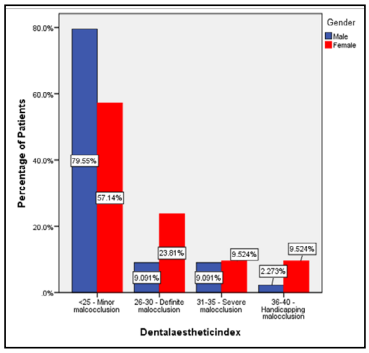


Figure 7: Cluster bar chart showing association between age and orthodontic treatment needs. X axis shows orthodontic treatment needs and Y axis shows number of patients. Chi-square test was done and found to be statistically not significant (Chi-square value = 4.647 p value = 0.590). Most of the patients in all groups needed slight orthodontic treatment, followed by elective treatment, desirable orthodontic treatment and mandatory treatment. However, 33-40 years not needed for elective and mandatory treatment.

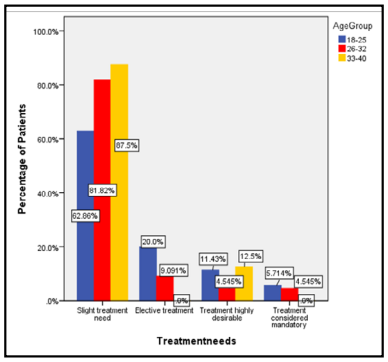
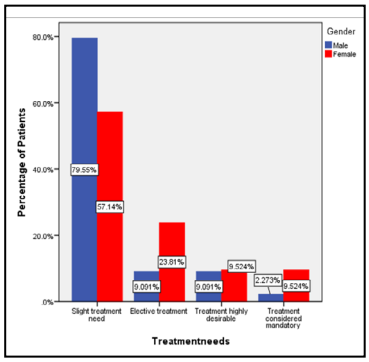


Figure 8: Cluster bar chart showing association of gender with orthodontic treatment needs. X axis represents orthodontic treatment needs and Y axis represents number of patients. Chi-square test was done and found to be statistically not significant (Chi-square value = 4.833; p value = 0.184). Most of the males (blue) needed a slight orthodontic treatment . However, females needed for elective and mandatory orthodontic treatment.



mandatory orthodontic treatment respectively as shown in Figure 7. In Figure 8, about 79.55% males and 57.14% females needed slight orthodontic treatment, 9.091% and 23.81% of male and female patients needed elective orthodontic treatment, also 9.091% and 9.524% females needed highly desirable orthodontic treatment and about 2.273% and 9.524% male and female patients needed mandatory orthodontic treatment.

Discussion

The importance of identifying these malocclusion cannot be stressed enough as they do not only have aesthetic concerns but also function and oral health. There were significant differences in gender as more males were recruited into this study compared to females; 67.7 percent. Besides that, most of the study participants (53.85%) were between the age group of 18-25 years old. The present study data shows that most of the patients (72.31%) had a dental aesthetic score below 25, followed by patients (13.85%) with dental aesthetic scores of 26-30, and then by patients with scores of 31-35 (9.23%) and above 36 (4.62%), respectively. Chi-square test between age and the severity of malocclusion gave a value of 4.647 and was found to be statistically not significant (p=0.590). Chi-square test between the variables gender and severity of malocclusion yielded a value of 4.833 and was also reported to be statistically not significant (p=0.184).

A supportive study reports that prevalence of some particular malocclusions may decrease or increase with time.[26] Studies are conducted on young populations because of the significance of age in context of early treatment. As most malocclusions may correct themselves or worsen with time depending on the growth pattern or environmental factors, such as early loss of deciduous teeth or trauma [27]. The reason as to why malocclusion becomes severe as age progresses has been talked about widely in the dental community, though very few studies are employed on relating an

etiological factor that associates older age with increase in severity of malocclusion. It can be theorised that alteration in the dimensions of the jaw as age progresses may be a possible explanation as to why malocclusion becomes severe along the years. Older patients are also more prevalent to have poorer oral hygiene and this could lead to development of dental caries which leads to loss of tooth structure followed by drifting of teeth or even causing changes to the surrounding gingiva and periodontium that will eventually lead to more severe malocclusion. The prevalence of malocclusion in the study population is also less as most of the patients present with minor or no malocclusion. This is evident as the number of patients with severe and handicapping malocclusion are less than 15% of the overall population whereas patients with minor and definite malocclusion make up the majority of the study population which is above 80%. This study will help to provide knowledge for better educating the people on malocclusion and the need for seeking treatment and can also enable governmental and non-governmental bodies to provide efficient dental health programmes to the mass and also helps dentist to better motivate patient to seek treatment on top of being able to procure more efficient treatment plan as it could be used as a great tool of assessment for early screening. The limitations of the study were that this was a unicentric study with geographic limitations, limited sample size and has lower external validity. Our institution is passionate about high quality evidence based research and has excelled in various fields [28-38]. The future scope of this study would be to increase the sample size by making it multicentric which could yield better results and higher correlation with varied interpretations.

Conclusion

Within the limitations of the present study, females had severe handicapping malocclusion compared to males. Also females needed mandatory orthodontic treatment compared to males. No association between age, gender with dental aesthetic score and orthodontic treatment needs. Though dental aesthetic score is an epidemiological tool, other diagnostic tools such as cephalometrics and digital model analyzer will be needed to find the severity of malocclusion and orthodontic treatment needs.

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