

ASSESSMENT OF PREVALENCE AND GENDER BASED DISTRIBUTION OF VARIOUS DENTAL MALOCCLUSION - A RETROSPECTIVE STUDY

Prerna Jain¹, Nivethigaa B², Manish Ranjan³

Abstract

INTRODUCTION : At all social levels, well-aligned teeth and a pleasing smile reflects positive status, and irregular or protruding teeth reflect negative status. In majority, balanced facial feature is considered to be pleasing for each race and sex. Malocclusion can be defined as an occlusion in which there is mal-relationship between the arches in any of the three planes or anomalies in tooth position beyond normal limits

AIM: The aim of the study was to assess the prevalence and gender based distribution of different dental malocclusion.

MATERIALS AND METHODOLOGY: This was a retrospective cross sectional study. Samples were collected from patient records from Saveetha dental college between June 2019- March 2020. Of the total case records of 41,000 patients, age sorting was done and the final 17150 patient data between the age group 18-35 years were collected. The data was collected only for patients who had all teeth present for diagnosis of molar relation. Tabulated with parameters of age, gender and dental malocclusion. It was imported to SPSS for statistical analysis. Descriptive statistics and chi square test was done.

RESULTS : Out of a total of 41,000 patients, analysis showed that there were 17150 patients in the required age group of which 60.4% were males and 39.6% were females. The prevalence of male patients was more when compared to female patients and the common age group in the study analysis is 26-30 years. Class I malocclusion was found to be the most predominant dental malocclusion (94.3%) and Class II Division 2 subdivision was the least prevalent. There was a statistically significant difference in the prevalence of various dental malocclusion in male and female population with a p value of 0.000.

CONCLUSION : Within the limits of the study, in both the gender, class I malocclusion was more prevalent and class II Division 2 subdivision was least prevalent.

KEYWORDS : Age; Angle's classification; diagnosis; gender; molar relation.

I. Introduction

Oral health can affect the general health, education and development of a well being. Facial appearance plays a major role in all stages of human life and this has a great impact during various phases [1]. At all social levels, well-aligned teeth and a pleasing smile reflects positive status, and irregular or protruding teeth reflects negative status [2,3]. In majority, balanced facial feature is considered to be pleasing for each race and sex [4].

¹ Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences, Saveetha university, Chennai-77, Email ID : 151601003.sdc@saveetha.com

² Corresponding author: Senior lecturer, Department of Orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha university, Chennai-77, Email ID : nivethigaab.sdc@saveetha.com

³ Associate professor, Department of Conservative and Endodontic Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and technical sciences, Saveetha university, Chennai - 77, Email ID : manish@saveetha.com

Malocclusion is a disorder affecting normal development of the occlusion and has a multifactorial etiology [5]. It can be defined as an occlusion in which there is mal- relationship between the arches in any of the three planes or anomalies in tooth position beyond normal limits. If a malocclusion is identified early; simple, preventive and interceptive measures can alleviate a developing malocclusion [6]. The incidence of various categories of malocclusion in a particular population is necessary to provide a basis for planning preventive and interceptive orthodontics. Although malocclusion is not life-threatening [7], it can be considered as a public health problem due to its high prevalence and its effect on social and medical well being. [8, 9] . The major causes of malocclusion have been extra teeth, lost teeth, impacted teeth, or abnormally shaped teeth [10, 11] . Malocclusions feature the third highest prevalence among oral pathologies, second only to tooth decay and periodontal disease and therefore rank third among world-wide dental public health priorities [12].

Malocclusions are the result of orofacial adaptability to various etiological factors, which result in various implications such as psychosocial problems related to impaired dentofacial aesthetics, disturbances of oral function, such as mastication, swallowing ,speech and greater susceptibility to trauma and periodontal disease [13]. It may have a stronger and longer lasting impact on oral health-related quality of life than other factors because it is associated with poor speech capability and poor chewing capability [14]. A number of studies have demonstrated its impact on quality-of-life [15, 16]. Since the public equates good dental appearance with success in many pursuits and societal forces define the norms for acceptable, normal and attractive physical appearance, an individual with malocclusion might develop a feeling of shame about their dental appearance and may feel shy in social situations or lose career opportunities.

There are several methods that may be used to evaluate, describe and classify occlusion. Since its development in 1986, the dental aesthetic index (DAI) has proven to be simple and rapidly applied [17]. A previous report has demonstrated the high reliability and validity of this index, which also compares favourably with other indices [18, 19] . It is a cross-cultural index that links clinical and esthetic components mathematically to produce a single score. This index can be used for different communities and populations without requiring any modification [20].

Angle's classification of malocclusion in 1899 was an important step in the development of orthodontics [21, 22] . It classified the major types of malocclusion, provided the first clear definition of normal occlusion in natural dentition and still remains the most widely used and accepted method of assessment of malocclusion internationally [23]. Most of these studies have been conducted to determine the prevalence of malocclusion based on a narrow perspective focusing on specific age groups to fulfil the goal of the investigation [24]. A review of the literature related to the recording of malocclusion reveals published investigations which consider children and adolescents and only a few concentrate on malocclusion distribution for adults [25]. So more studies are required to focus on the malocclusion distribution in adults. The recognition of malocclusion as an important problem in the public dental health services implies a need for rational planning of preventive and therapeutic orthodontic measures.

The aim of this study was to assess the prevalence and gender based distribution among male and females.

II. MATERIALS AND METHODOLOGY

The retrospective study was done under a university setting. Records of patients who visited Saveetha dental college and hospitals, Chennai were evaluated between June 2019-March 2020. This study was approved by the institutional ethics board. Two reviewers were involved in this study. Of the total case records of 41,000 patients, age sorting was done and the final 17,150 patient data between the age group 18-35 years were collected. Only the patients who had all teeth were present for evaluation of molar relation. Any missing teeth or any development disorder was considered as the exclusion criteria. To minimise sampling bias, all available data was included with a sorting process of removing double entries. Internal validity of the study was to record the molar relation of all the patients and the external validity was needed for a large sample to define the entire population.

Data collection was evaluated by the patient record visiting Saveetha dental college and hospitals, Chennai during the given time frame . This data was obtained from the molar relation of the clinical examination diagnosis given for all the patients and it was further tabulated. This data was again verified along with clinical pictures. If any missing teeth were present , they were excluded from the study. Data was verified by one

external reviewer. This data was then exported to SPSS and the variables were identified. Descriptive statistics and chi square test were performed on the data using SPSS version 20 software. Age and gender were considered as independent variables. Molar relation was considered as a dependent variable.

III. RESULTS

The data collected from the patient case records were tabulated in SPSS and the descriptive statistics was obtained. Out of a total of 41,000 patients, analysis showed that there were 17,150 patients in the required age group of which 60.4% were males and 39.6% were females.

Most common age group present in the study analysis was 26-30 years which constitutes about 31.06 % of the total population. The frequencies of different age groups were depicted in figure 1.1 , figure 1.2 showed frequency and percentile of male and female involved in the study which showed that males constituted the highest percentage (60.4%).

In the present data, patient records identified included class I malocclusion (9782 males and 6385 females), Class II div 1 malocclusion (244 males and 222 females); class II div 1 subdivision (107 males and 87 females) ; Class II div 2 (45 males and 25 females) ; Class II div 2 subdivision (15 males and 6 females) ; Class III malocclusion (129 males and 42 females) and Class III subdivision, (42 males and 19 females). Class I malocclusion is the most prevalent dental relation which is depicted in , figure 1.3 – showing the frequency and percentage of dental malocclusion involved in the study.

Chi square test was done between gender and dental malocclusion of the population. Results showed that there was a statistically significant difference in the prevalence of various dental malocclusion in male and female population with a p value of 0.000. Most common dental malocclusion seen in males is class I malocclusion which is represented in (Figure 2)

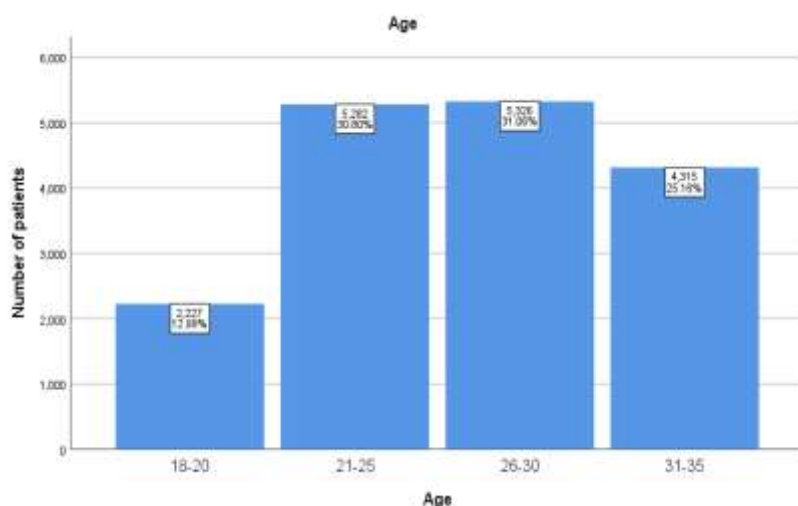


Figure 1.1: Age distribution involved in the study. This graph shows frequency distribution of samples in various age groups. X axis denotes age distribution and y axis denotes number of patients. Out of the 17150 patients in the study, 2,227 (12.99%) patients were in the age group 18-20 years, 5,282 (30.8%) patients under 21-25 years; 5,326 (31.06%) patients in 26-30 years old and 4,315 (25.16%) patients in the age group of 31-35 years old. The samples were mostly within 21- 30 years of age group.

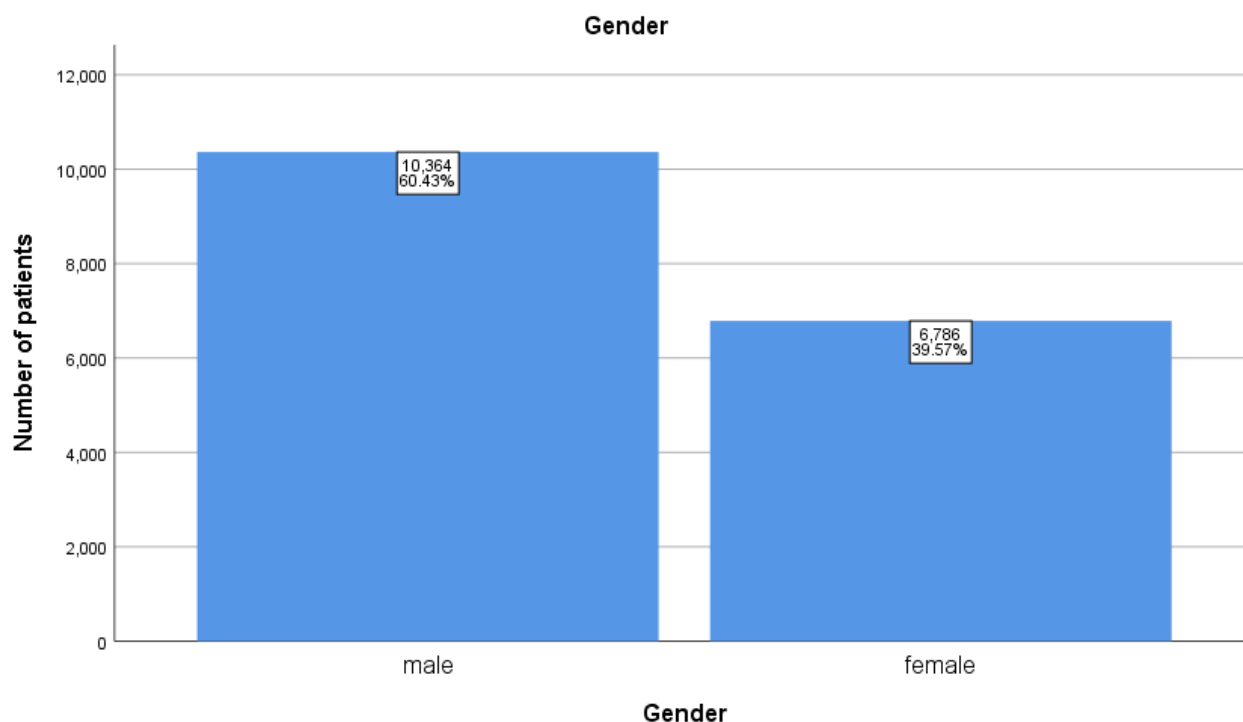


Figure 1.2 : Bar graph shows gender distribution of the study samples. X axis denotes gender distribution and y axis denotes number of patients. Out of the 17150 patients in the study, 10,364 (60.43%) patients were males and 6,786 (39.57%) patients were females.

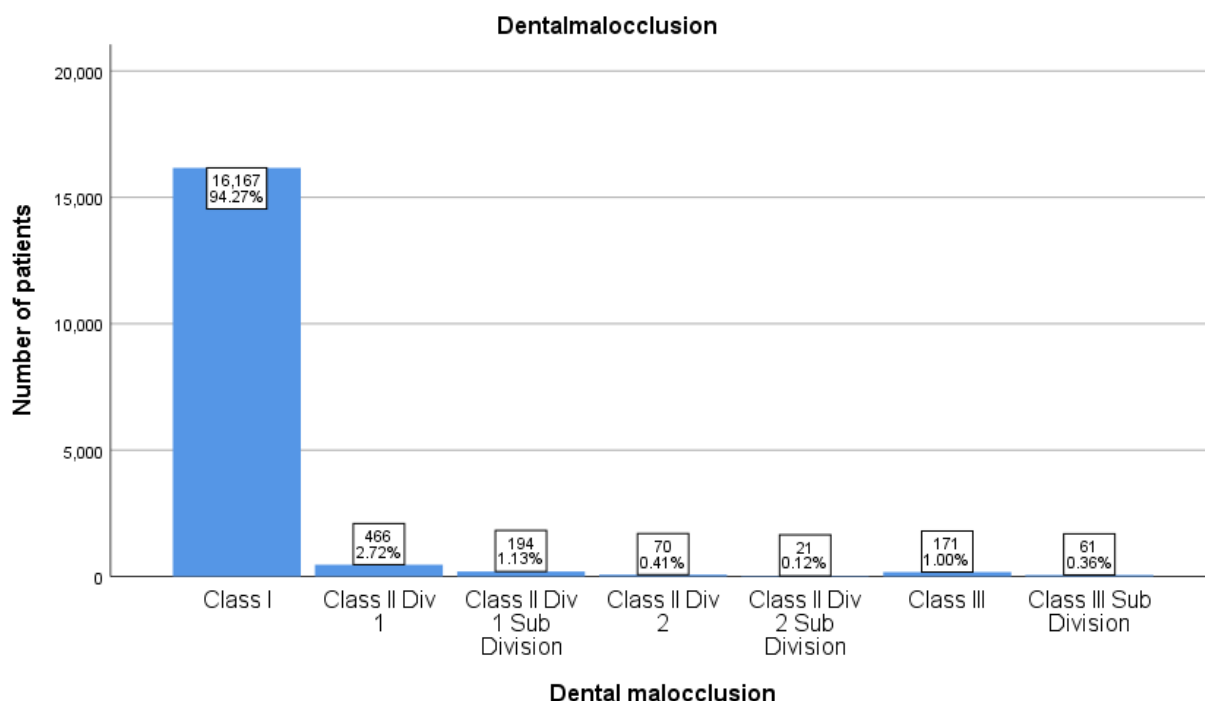


Figure 1.3: Bar graph shows frequency distribution of dental malocclusion among the number of patients. X axis denotes dental malocclusion and y axis denotes number of patients. Out of the 17150 patients in the study; 16,167 (94.27%) patients were diagnosed with Class I malocclusion ; 466 (2.7%) patients - Class II Div 1 ; 194 (1.1%) patients - Class II Div 1 subdivision ; 70 (0.45) patients - Class II Div 2 ; 21(0.1%) patients - Class II

Div 2 subdivision ; 171 (1%) patients - Class III ; 61 (0.36%) patients - Class III subdivision. Class I malocclusion was most prevalent and class II div 2 subdivision was least reported.

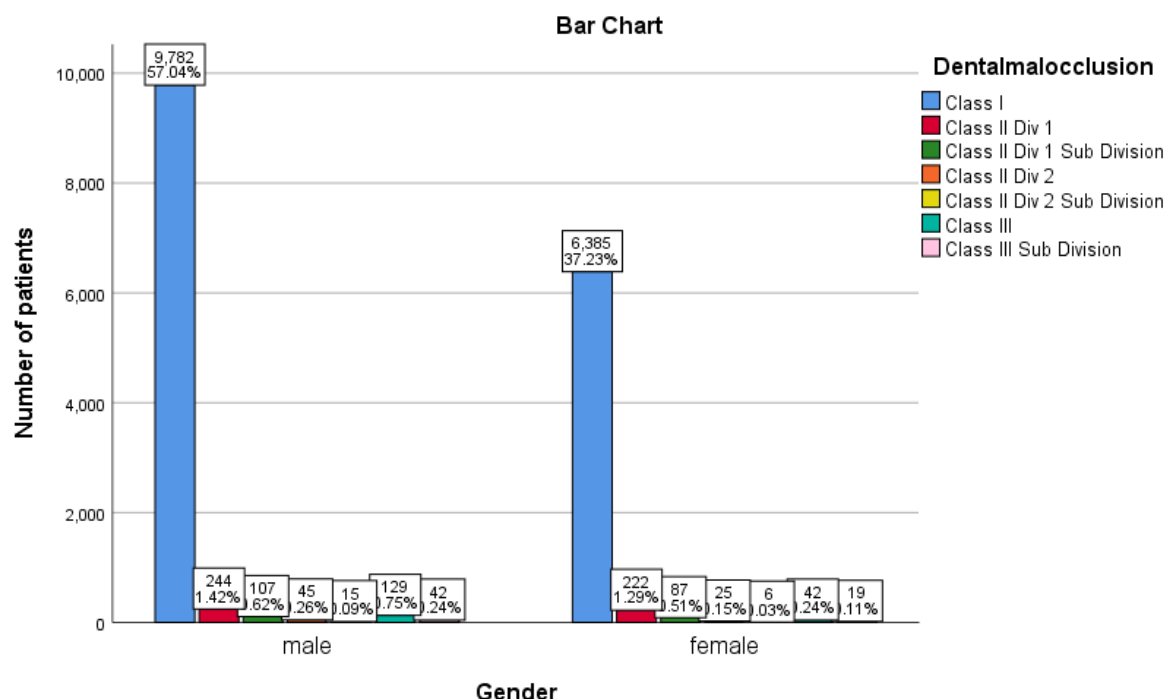


Figure 2 :Bar graph represents the association between gender and dental malocclusion of number of patients in the age group of 18-35 years where blue colour denotes Class I malocclusion, red colour denotes Class II Div 1 , green colour denotes Class II Div1 subdivision, orange colour denotes Class II Div 2, yellow colour denotes Class II Div 2 subdivision, turquoise blue denotes Class III and pink colour denotes Class III subdivision . X axis denotes the gender and Y axis denotes the number of patients. Pearson's chi square value : 34.403, p value :0.000 , hence statistically significant (Chi square analysis) Both in male and female population, class I malocclusion was most prevalent and class II division 2 was least prevalent and the results of the study showed statistical significance between both genders, probably because of the difference in the samples among both gender.

IV. DISCUSSION

Maintaining proper oral hygiene goes a long way in preventing any form of dental disease [26]. An adequate alignment among the teeth and interdigitation between the arches will reduce gum recession, trauma to the teeth, cavity, gum diseases, and attainable loss of teeth in the population [27]. Malocclusion and dentofacial deformities are highly prevalent and can influence physical, social, and psychological functioning, thus playing an important role in social acceptance and interactions.[28]. Orthodontic treatments are done to correct malocclusions and craniofacial abnormalities, by providing proper alignment of teeth, provide harmony between occlusal and jaw relationship, help improve mastication, phonation, with beneficial effects on the general and oral health, individual's comfort and self esteem, and having a positive role in improving their quality of life [29].

There are numerous studies [30], published describing the prevalence of malocclusion and its different types. But some authors [31], found many difficulties to compare these findings because of the great variability of methods and indices used by one examiner and another to record occlusal relationships. Distribution of different types of malocclusion may show great variability even in a population of the same origin.

As we moved onto our study, the most common gender present in the study was male. This was in agreement with the study conducted by Siddegovda R et al [32], which concluded that males are the most predominantly present in the study compared to females. This similarity is seen due to similar sample size and ethnicity of population.

A study conducted by Silva RG et al [33], reported that the most common molar relation seen in his study was Angle's Class I malocclusion. This was in acceptance with the present study where the most prevalent molar relation is Angle's Class I malocclusion – 94.3% followed by Class II div 1 – 2.7%, Class II subdivision- 1.1%, Class II div 2 – 0.4%, Class II div2 subdivision- 0.1%, Class III – 1%, Class III subdivision – 0.4%. The possible reason for this similarity is seen in the majority of the population.

Alkarakat SF et al [34], reported that the most common age group in this study was 12-20 years. This was in contradiction with the present study which reported the common age group was 26-30 years old. The reason for this difference is seen due to different categories of samples size.

Few limitations of the study design might be that the study was single centred, similar ethnicity and geographical location. Any patient with missing teeth was also considered a limitation to the study. From the study, it was understood that extensive research involving a larger population was required. To overcome the shortcomings with the Angles system of classification, other methods can also be used provided sufficient details are available for larger samples.

V. CONCLUSION

Within the limits of the study, in both the gender, class I malocclusion was more prevalent and class II Division 2 subdivision was least prevalent. Furthermore, appraisal of malocclusion knowledge in children can facilitate efforts to prevent such a disorder and its consequences making it possible to reduce complexity of expensive orthodontic treatment. This might help to minimise or eliminate further treatment needs.

ACKNOWLEDGEMENT

We thank our statistician for helping in manuscript preparation

AUTHOR CONTRIBUTION

Perna contributed in study design, manuscript preparation, Dr. Nivethigaa B contributed to manuscript writing and proof-reading and Dr. Manish contributed to the statistical framework.

REFERENCES

- [1] Sivamurthy G, Sundari S. Stress distribution patterns at mini-implant sites during retraction and intrusion—a three-dimensional finite element study. *Progress in Orthodontics* 2016;17.
<https://doi.org/10.1186/s40510-016-0117-1>.
- [2] Shaw WC. The influence of children's dentofacial appearance on their social attractiveness as judged by peers and lay adults. *Am J Orthod* 1981;79:399–415.
- [3] Shaw WC, Rees G, Dawe M, Charles CR. The influence of dentofacial appearance on the social attractiveness of young adults. *Am J Orthod* 1985;87:21–6.
- [4] Bravo LA. Soft tissue facial profile changes after orthodontic treatment with four premolars extracted. *Angle Orthod* 1994;64:31–42.

- [5] Samantha C, Sundari S, Chandrasekhar S, Sivamurthy G, Dinesh S. Comparative Evaluation of Two Bis-GMA Based Orthodontic Bonding Adhesives - A Randomized Clinical Trial. *J Clin Diagn Res* 2017;11:ZC40–4.
- [6] Mtaya M, Brudvik P, Astrøm AN. Prevalence of malocclusion and its relationship with socio-demographic factors, dental caries, and oral hygiene in 12- to 14-year-old Tanzanian schoolchildren. *Eur J Orthod* 2009;31:467–76.
- [7] Karaiskos N, Wiltshire WA, Odum O, Brothwell D, Hassard TH. Preventive and interceptive orthodontic treatment needs of an inner-city group of 6- and 9-year-old Canadian children. *J Can Dent Assoc* 2005;71:649.
- [8] Krishnan S. Effect of Bisphosphonates on Orthodontic Tooth Movement—An Update. *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH* 2015. <https://doi.org/10.7860/jcdr/2015/11162.5769>.
- [9] Vikram NR, Prabhakar R, Kumar SA, Karthikeyan MK, Saravanan R. Ball Headed Mini Implant. *J Clin Diagn Res* 2017;11:ZL02–3.
- [10] Krishnan S, Pandian K, Kumar S. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. *Indian Journal of Dental Research* 2018;29:137. https://doi.org/10.4103/ijdr.ijdr_496_16.
- [11] Kamisetty SK. SBS vs Inhouse Recycling Methods-And Invitro Evaluation. *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH* 2015. <https://doi.org/10.7860/jcdr/2015/13865.6432>.
- [12] Brito DI, Dias PF, Gleiser R. Prevalência de más oclusões em crianças de 9 a 12 anos de idade da cidade de Nova Friburgo (Rio de Janeiro). *Revista Dental Press de Ortodontia E Ortopedia Facial* 2009;14:118–24. <https://doi.org/10.1590/s1415-54192009000600014>.
- [13] Tak M, Nagarajappa R, Sharda AJ, Asawa K, Tak A, Jaliha S, et al. Prevalence of malocclusion and orthodontic treatment needs among 12-15 years old school children of Udaipur, India. *European Journal of Dentistry* 2013;07:S045–53. <https://doi.org/10.4103/1305-7456.119071>.
- [14] Viswanath A, Ramamurthy J, Dinesh SPS, Srinivas A. Obstructive sleep apnea: awakening the hidden truth. *Niger J Clin Pract* 2015;18:1–7.
- [15] Marques LS, Ramos-Jorge ML, Paiva SM, Pordeus IA. Malocclusion: Esthetic impact and quality of life among Brazilian schoolchildren. *American Journal of Orthodontics and Dentofacial Orthopedics* 2006;129:424–7. <https://doi.org/10.1016/j.ajodo.2005.11.003>.
- [16] Bernabé E, Flores-Mir C, Sheiham A. Prevalence, intensity and extent of Oral Impacts on Daily Performances associated with self-perceived malocclusion in 11-12-year-old children. *BMC Oral Health* 2007;7:6.
- [17] Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. Paperpile n.d. <https://paperpile.com/app/p/483b3829-1ddc-0a8c-aca4-041558c3cf82> (accessed June 2, 2020).
- [18] Gupta A. Orthodontic Treatment Needs of Children Living in Orphanage According to the Dental Aesthetic Index (DAI). *Journal of Dental Health, Oral Disorders & Therapy* 2015;2. <https://doi.org/10.15406/jdhodt.2015.02.00036>.
- [19] Camilleri S, Mulligan KM. The prevalence of malocclusion in Maltese schoolchildren as measured by the Index of Orthodontic Treatment Need 2007.
- [20] Rubika J, Sumathi Felicita A, Sivambiga V. Gonial Angle as an Indicator for the Prediction of Growth Pattern. *World Journal of Dentistry* 2015;6:161–3. <https://doi.org/10.5005/jp-journals-10015-1334>.

- [21] Classification of malocclusion. dental Cosmos. Paperpile n.d. <https://paperpile.com/app/p/00549198-e827-020f-8b92-1fddd39e3055> (accessed June 2, 2020).
- [22] Jain RK, Kumar SP, Manjula WS. Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch. *J Clin Diagn Res.* 2014;8(7):ZC21-ZC24. doi:10.7860/JCDR/2014/8339.4554.
- [23] Recording and measuring malocclusion: A review of the literature. Paperpile n.d. <https://paperpile.com/app/p/125b1743-15b1-0c08-a761-76ca3f6ff6e4> (accessed June 2, 2020).
- [24] Ramesh Kumar KR, Shanta Sundari KK, Venkatesan A, Chandrasekar S (2011) Depth of resin penetration into enamel with 3 types of enamel conditioning methods: a confocal microscopic study. *Am J Orthod Dentofacial Orthop* 140:479–485.
- [25] Felicita AS. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction - A case report. *Saudi Dent J.* 2017;29(4):185-193. doi:10.1016/j.sdentj.2017.04.001.
- [26] Felicita AS, Chandrasekar S, Shanthasundari KK. Determination of craniofacial relation among the subethnic Indian population: a modified approach - (Sagittal relation). *Indian J Dent Res.* 2012;23(3):305-312. doi: 10.4103/0970-9290.102210.
- [27] Dinesh SP, Arun AV, Sundari KK, Samantha C, Ambika K. An indigenously designed apparatus for measuring orthodontic force. *J Clin Diagn Res.* 2013;7(11):2623-2626. doi:10.7860/JCDR/2013/7143.3631.
- [28] Mahendran S, Saveetha Dental College and Hospitals, Saveetha University, - C, Dhanraj, Sangeetha, et al. Status of malocclusion among adults in rural areas. *International Journal of Current Advanced Research* 2017;6:2958–60. <https://doi.org/10.24327/ijcar.2017.2960.0153>.
- [29] Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The slingshot method. *Saudi Dent J.* 2018;30(3):265-269. doi:10.1016/j.sdentj.2018.05.001.
- [30] Basic method for recording occlusal traits. Paperpile n.d. <https://paperpile.com/app/p/5e5c4b9c-d60e-07d3-a696-51bec1834134> (accessed June 2, 2020).
- [31] Recording and measuring malocclusion: A review of the literature. Paperpile n.d. <https://paperpile.com/app/p/125b1743-15b1-0c08-a761-76ca3f6ff6e4> (accessed June 2, 2020).
- [32] The prevalence of malocclusion and its gender distribution among Indian school children: An epidemiological survey. Paperpile n.d. <https://paperpile.com/app/p/4509858c-97b1-08c6-90db-2b22a83f632e> (accessed June 2, 2020).
- [33] Prevalence of malocclusion among Latino adolescents. Paperpile n.d. <https://paperpile.com/app/p/9398cc87-270f-03f5-8a9d-d28502c5e70e> (accessed June 2, 2020).
- [34] Farhat Yaasmeen Sadique Basha, Rajeshkumar S, Lakshmi T, Anti-inflammatory activity of *Myristica fragrans* extract . *Int. J. Res. Pharm. Sci.*, 2019 ;10(4), 3118-3120 DOI: <https://doi.org/10.26452/ijrps.v10i4.1607>
- [35] Malocclusion traits in Saudi females seeking orthodontic treatment. Paperpile n.d. <https://paperpile.com/app/p/3f13dc53-dfa1-03e5-8f27-0d3e1be7e4cf> (2002).