Assessment of Efficacy of Novel Method of Quantifying and Grading Class II Malocclusion in Vidarbha Population

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Study Protocol

ABSTRACT

Background: It is important to quantify class II malocclusion for proper diagnosis of the case and adjusted treatment will aid in successful correction of malocclusion. Hence, the study will aid for proper treatment planning by classifying class II malocclusion established on the amount of overjet, overbite, distance and relation of maxillary and mandibular first molar and the relationship of canine and molar.
Objectives: To grade Class II malocclusion in form of overjet and overbite.
Materials and Methods: Patients visiting Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College, Wardha, having class II malocclusion will be chosen. The chi square test, student's paired and unpaired t test, and descriptive and inferential statistics will be used in the statistical analysis.
Expected Results: The outcome after conduction of the study is expected to have more patients with Type 1 overjet and Type B overbite kind of Class II malocclusion.
Conclusion: The establishment of this new classification will aid in concise analysis and proper treatment planning of Class II malocclusion thereby enhancing the esthetics and functional stability for the patient comfort.

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1. INTRODUCTION

A malocclusion is a misalignment or improper relationship between the teeth of maxilla and mandible. Edward Angle, the "Father of Modern Orthodontics," created the phrase as a derivation of derivation of spatial relation [1]. When the teeth are in abnormal relation it is known as dental malocclusion whereas, when the jaws are in abnormal relation it is known as skeletal malocclusion.The maxillary first permanent molar's mesiobuccal cusp articulates with the mandibular first permanent molar's buccal groove , as well as the "Distal" relation of upper and lower jaw as claimed by Angle's Class II [2]. The categorization of Class II malocclusion was divided into three categories -

Division 1:-The upper anteriors labioversion

Division 2:- The maxillary central incisors are close to normal or somewhat linguoverted, while the maxillary lateral incisors have labially pointed.

Spite of the fact that Angle's malocclusion category has been in use for over a century, it still has a number of flaws. Only in the antero-posterior plane did he consider malocclusion [3]. His category prohibit to distinguish between skeletal and dental malocclusions, and it does not pertain to the primary teeth. Moreover, Individual tooth malpositions have not been considered by Angle.

Therefore , Moyers defined new classification for classifying skeletal class II malocclusion. He divided it into two types i.e vertical and horizontal [4]. Basically, Skeletal class II discrepancy occur when mandibular jaw is in posterior relation to the maxillary jaw when seen in sagittal relation. It may occur due to either maxillary jaw excess or mandibular jaw discrepancy [5]. It can also happen due to the tiny size of the ramus and body of the mandible, which causes the jaw to rotate downward and backward. Dental Class II malocclusions are frequently connected with skeletal discrepancies [6]. Any habit or soft tissue anomaly that causes labioversion of maxillary anteriors and/or backward inclination of the mandibular anteriors can result in an increase in overjet on skeletal Class I or even a Class III [7]. Moyers formulated classification based on skeletal and dental relationship. But, still he had drawbacks such as he did not quantified the malocclusion [5]. Neither he divided it into any

classes as Angle's did. He did not mention about molar and canine relationship [8]. He did not even mention about overjet and overbite. He only considered the sagittal plane in his classification

Though there are ample amount of classifications given in the field of orthodontics, for classifying the relation between class II dental arches, there is more to contribute towards the classifications, as none of the classifications describe the extent to which malocclusion is present and the how to perform treatment planning of such malocclusion [9]. There are the cases where patient present with end-on molar relationship, as for now these cases are included in class II malocclusion but treating these patients as class II becomes difficult as there can be a notable difference between the presentation of malocclusion [10]. In class II malocclusion position of both upper and lower anterior teeth becomes very important and relation i.e overjet has to be established for proper diagnosis and treatment planning. Today, no such data is available for quantifying overjet in class II malocclusion which would prevail in treatment planning [9]. Considering the importance of overjet and overbite a new classification is to be formulated. The study will be planned with aim of establishing new classification in the given population. This classification becomes important as most of the patient undergoing orthodontic treatment are from age group of 15 – 25 years and the aesthetics and the functional stability are the prime demands from this age group [11]. So, the proper diagnosis of the case and adjusted treatment will aid in successful correction of malocclusion. The study will be planned for proper treatment planning by classifying class II malocclusion depending on the amount of overjet, overbite, distance and relation of maxillary and mandibular first molar and relationship of canine and molar [12].

1.1 Background/ Rationale

The findings of the study will help to classify the Class II malocclusion in a more precise way considering the overjet and overbite. Further the new classification will help us in accurate decision making in diagnosis and treatment planning.

1.2 Objectives

1. To quantify the Formal Class II malocclusion of molar relationship

2. To quantify the Formal Class II malocclusion of overjet and overbite.

3. To correlate the canine and molar relationship.

2. MATERIALS AND METHODOLOGY

2.1 Sample Size

Cochran formula for sample size:

$$n = \frac{Z\alpha/2^2.P.(1-P)}{E^2}$$

where;

$Z\alpha/2$ is the level of significance at 5% i.e 95% confidence interval = 1.96

P = prevalence of skeletal mandibular retrusion dimensional type = 28% = 0.28 d = desired error of margin

= 10% = 0.10

$$n = \frac{1.96^2 \times 0.26 \times (1-0.28)}{0.10^2}$$

=77.44
n =80

2.2 Study Reference

L. Perillo et al. [7]

2.2.1 Inclusion Criteria

1. Patients having skeletal or dental class II malocclusion
2. Patients having dental end-on relationship
3. Patients under 15 – 25 years of age group
4. Patients of Vidarbha population

2.2.2 Exclusion Criteria

1. Patients with anterior crowding
2. Patients with missing first molar
3. Patients with carious first molar
4. Patients with rotated first molar

2.3 Methodology

After receiving Ethical permission from the Institutional Ethical Committee, this research will be conducted in the Department of Orthodontics, Sharad Pawar Dental College and Hospital, Sawangi (Meghe), Wardha. 15 casts of individuals with skeletal or dental class II malocclusion and 15 of END- ON relation will be used in the next study.

Further, the cast will be classified according to the Class II molar relation and End-on molar relation. Moreover, for the study purpose we classify the severity of overjet and overbite as follows: The overjet of 4-5 mm is considered as Type 1. The overjet of 6-7 mm and 8-9 mm is considered as Type 2 and Type 3 respectively. Also the overjet of 10 mm and above is included in Type 4. Similarly, overbite of 2-4 mm is included in Type A. The overbite of 4-6 mm is Type B and complete closed bite is considered to be Type C:

2.4 Statistical Method

Statistical analysis will be performed using descriptive and inferential statistics such as the chisquare test, student's paired and unpaired t test, and software such as SPSS 27.0 version and graph pad, prism 7.0 version, with p less than 0.05 considered significant.

Bias- All the potential sources of the bias is removed.

Quantitative Variable – Gender, Growth pattern, study model.

3. EXPECTED RESULTS

Class II malocclusion is because of maxillary prognathism, mandibular backward inclination and combination of both these two features have varied etiology and clinical features. As in class II malocclusion cases mostly we see that the mandible is retrognathic. Due to this finding in class II malocclusion cases large overjet i.e 4-5 mm with deep bite upto 3-4 mm will be observed. Based on the dimensions of class II which are observed we can quantify the malocclusion more accurately and effortlessly.

OVERJET	OVERBITE
TYPE 1:- 4-5mm	TYPE A :-2-4mm
TYPE 2:- 6-7mm	TYPE B :-4-6mm
TYPE 3:- 8-9mm	TYPE C:- complete closed bite
TYPE 4:- 10mm and above	

4. DISCUSSION

There has been no proposal for a categorization of class II malocclusion build on overjet and overbite. As a result, the existing incisor classifications are as follows: One such classification was given by Ballard in 1965.Ballard's classification was used to know the various skeletal relationship. Its divided into 3 skeletal classes [5].

Skeletal class I:-The degree of tooth inclination is conventional, as is the dental relation, and crowns of the maxillary anterior would be passed through by the upward projection of mandibular anterior.

Skeletal class II:-The lower apical base is far too far back. The mandibular anterior axis run palatal to the maxillary anterior crown..

Skeletal class III :-The lower apical base is positioned too far forward, and lower incisor axis would pass between labial and upper anterior crowns.

British standard institute also gave a classification which have three classes.

Class I :-The mandibular anterior incisal third close with or rest just underneath the maxillary central incisor's cingulum.

Class II:-The mandibular incisal third occlude with or rest immediately below maxillary central incisor's cingulum.This category gets divided into two parts .

Class III :-The incisal third of mandibular central incisors are placed before the cingulum of the maxillary anteriors. The overjet is reduced or reversed.

Despite the fact that these classifications have been proposed, they are not widely used. The study's findings will aid in more concisely classifying Class II malocclusions based on overjet and overbite [3].

Furthermore, the new classification will help us make more accurate diagnosis and treatment plans.

4.1 Generalizability

The study has a good external and internal validity.

5. CONCLUSION

For numerous years, the writers, supported by a significant body of research, have disputed the logic, base, and orthodontic treatment philosophy of traditional categorization. Angle's 1899 categorization of malocclusion is not functionally founded and without the basic biological or pathological base required to make a analysis, let alone a classification. This new categorization of class II malocclusion based on overjet and overbite will allow for more detailed analysis and treatment planning. Simply put, regardless of facial profile, categorization and upcoming treatment should be applied broadly. Malocclusion's basic nature as a disease, rather than a superficial solution to arbitrarily defined need and race-related constricted "ideal", must be emphasized.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Gravely JF, Johnson DB. Angle's classification of malocclusion: an assessment of reliability. British journal of orthodontics. 1974;1(3):79-86
2. Yasim MM, Evangelina IA, Sunaryo IR. Interpreting subdivision in a malocclusion Angle's classification system among orthodontics. Padjadjaran Journal of Dentistry. 2012;24(3).
3. Janson G, Sathler R, Fernandes TM, Zanda M, Pinzan A. Class II malocclusion occlusal severity description. Journal of Applied Oral Science. 2010;18(4):397-402.
4. Tehranchi A, Behnia H, Younessian F, Hadadpour S, Advances in Management of Class II Malocclusions August 31st 2016, DOI: 10.5772/63348
5. Jawalekar R, Hazare P, Kamble R.H Jadhav V, Correlation of Angle SNA to Angle NSAR in Normal Occlusion, Class II Division I and Class III Malocclusion in

Vidarbha Region-A Cephalometric Study. 2021;10(32).

6. Kallunki J, Bondemark L, Paulsson L Outcomes of Early Class II Malocclusion Treatment - A Systematic Review Jan 19, 2018
DOI; 10.24966/DOHC-6783/100009

7. Perillo L, Padricelli G, Isola G, Femiano F, Chiodini P, Mataresei G. Class II malocclusion division 1: a new classification method by cephalometric analysis. European Journal of Paediatric Dentistry. 2012;13(3):192.

8. Bansal A, Deolia S, shakir S, Gupta A, Reche A, Nimbulkar G. Assessment of Association Between Tooth Morphology and Psychology. 2020;14(2):10-12,3.

9. Oh H, Baumrind S, Korn E, Dugoni S, Boero R, Aubert M, Boyd R- A retrospective study of class II mixed-dentition treatment. 2016;87(1).

10. Bishen K, Chhabra K, Sagari S, and Gupta P,Nationwide survey on barriers for dental research in India. 2015;7(3):201–206.
doi: 10.4103/0975-7406.160017.

11. Bhat Z, Naik C, Rahalkar J ; Early intervention in Skeletal Class II and dental Class II division I malocclusion; 2013.
DOI: 10.4103/2321-1407.117380

12. Moyers R, Michael R, Kenneth G, Wainright R, Bookstein F. Differential diagnosis of Class II malocclusions Part 1. Facial types associated with Class II malocclusions. 1980;78(5):477-494.

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