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PREDICTION OF INCISAL TOOTH MORPHOLOGY IN PATIENTS REPORTING FOR ORTHODONTIC TREATMENT

Hanshika Ravi[1], Dr.A. Sumathi Felicita[2], Dr.Dinesh prabu[3]

[1]*Saveetha Dental College and Hospitals, Saveetha institute of Medical and Technical sciences, Saveetha University, Chennai.*
[2]*Reader,Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University,Chennai.*
[3]*Senior Lecturer, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences,*
Saveetha University, Chennai.
[1]*151501100.sdc@saveetha.com*
[2]*sumathifelicita@saveetha.com*
[3]*dineshprabum.sdc@saveetha.com*

ABSTRACT:

Morphology of tooth varies among individual patient.It is an important consideration in evaluating occlusion and esthetics.The incisor teeth have different shapes namely triangular, rhomboid, square. Shape of incisors also plays a major role in esthetics.It is important for proper finishing of the dentition at the end of orthodontic treatment.The aim of this study is to determine the incisal tooth morphology of the patients visiting the orthodontic treatment.This study was conducted as a hospital based study localised to the Chennai population. Data was systematically reviewed and retrieved from the archived database.The data was grouped into two groups. Group 1 patients had class I malocclusion and Group 2 Patients had class II and Class III malocclusion. Shape of incisors were evaluated for all the patients of both the groups. On analysing the results, among the patients of Group1, 84.21% of the males and 91.30% of the females had triangular incisors.Among the patients of Group 2, 70.59% of males and 68.42% of the females had triangular incisors, irrespective of the type of malocclusion. On chi square analysis, the value was found to be 0.356 (p value > 0.005), does not have significant association.It was concluded that the most predominant shape of the incisors was found to be triangular.

KEYWORDS: Incisors,Orthodontic treatment,tooth morphology.

INTRODUCTION:

The maxillary incisors are the most dominant teeth displayed during a smile.The shape of the anterior teeth has a significant influence on smile aesthetics(Philips, 1996),.The crown shape was also ranked the highest among all various features that contribute to the overall dental attractiveness (Hussain *et al.*, 2016).The concern with facial aesthetics has prevailed over civilisations, and the faces representing the perfection of the beauty have continually been used as a reference(Morley and Eubank, 2001). Soft-tissue analysis has become an important component of orthodontic diagnosis and treatment planning. Photographic evaluation of an orthodontic patient is a very close representation of the appearance of the person.(Pandian, Krishnan and Kumar, 2018). When a person is smiling, the centre of visual attraction is the basic contour of the maxillary anterior teeth. Due to their position,the maxillary central incisors provide the illusion of being

the lightest and largest teeth in the mouth,making them the dominant teeth to smile (Morley and Eubank, 2001; Sarver, 2001).

The position, shape and contour of permanent upper central incisors enhanced the aesthetics of smile.Fracture of the maxillary anterior teeth and its subsequent management occur frequently in young patients (Felicita, 2018).Involving the reconstruction of the teeth, parameters are required to assist in elaborating a plan of treatment that corresponds to the expectation of both the patients and dental professionals(Rifkin, 2000). Because of this demand, many methods have been proposed to determine the shape of central incisors. In 1914, Williams suggested a correlation between inverted shape of the face and the shape of the upper permanent central incisors,the so called "law of harmony"(Leon Williams, no date).These teeth also had the highest bond failure rate(Samantha *et al.,* 2017). A balanced proportion in the appearance of the teeth is fundamental to compose an aesthetically pleasing smile(Van der Geld *et al.,* 2007) The Golden proportion, used to evaluate esthetics establishes the value in the ratio of 1:1:6181 (Ricketts, 1982)2,(Wolfart *et al.,* 2005). It is considered ideal and is frequently used. Nevertheless, golden proportion is just a reference and clinicians should not be limited by it and forget the individual spaces(Preston, 1993). Considerable research has been done on the various aspects of orthodontics(Felicita, Chandrasekar and Shanthasundari, 2012),(Krishnan, Pandian and Kumar S, 2015) (Viswanath *et al.*, 2015)(Dinesh *et al.*, 2013), (Kumar, Sundari and Venkatesan, 2011),(Rubika, Felicita and Sivambiga, 2015) (Felicita, 2017b) ((Sivamurthy and Sundari, 2016)(Kamisetty *et al.*, 2015).

Although the teeth must be in proportion to one another , they must also be in proportion to their face.A great variation in the size of the tooth in relation to the face may affect the ability to obtain a good aesthetic appearance (Rosenstiel and Ward, 2000; Goncalves and Gomes, 2009).Moreover the face can be classified as square,triangular or oval shaped(Seluk, Brodbelt and Walker, 1987).A controversy exists on whether there is a relationship between the shape of the tooth and shape of the face. In1914, Williams suggested that there is a relationship between the shape of the face and shape of the teeth(Cesario and Latta, 1984).However Sellen et.al.,(Sellen, Jagger and Harrison, 1998)mentioned that there is not necessarily any relation between the shape of the face and teeth(Vadavadagi *et al.*, 2015).

The aim of this study was to determine the incisal tooth morphology of the patients reporting for orthodontic treatment.

MATERIALS AND METHODS:

This study was conducted as a hospital based study localised to the Chennai population.Data was systematically reviewed and retrieved from patient collected from the institution's archived database from 21 st June 2019- 15 th April,2020.Patients of different age groups(from 11 to 30 years) who came for consultation at the institution was recruited.180 patients were randomly selected under two different groups,60 patients in each group - Group 1,Group 2. Group 1 was class I malocclusion and Group is class II and Class III malocclusion. Age and gender of the patients were independent variables.The study was evaluated and approved.

Shape of the incisors were evaluated for each patient in all two groups.Evaluation was done by analysing pre operative intraoral photographs of all the selected patients. The data was tabulated in Microsoft Excel with the following headings namely patient identification number, age,gender,type of malocclusion, shape of the tooth.

The above mentioned data was coded and transformed into a statistical package for social sciences(SPSS) version 25. A correlation test and chi square analysis was done. The results were recorded.

RESULTS AND DISCUSSION:

On analysing the Group 1, there were 37 Male patients and 23 females patients. All of them had class I malocclusion.52 patients had triangular shaped incisors - Male=31(51.6%),female=21(35%),7 Patients had squarish incisors -Male=5(8.3%),female=2(3.3%) and one patient with oval shaped incisors - Male=1(1.6%).(Table 1)

On analysing the second group,there were 40 male patients and 19 female patients.36 patients had classII division I malocclusion - 24 patients were male patients, out of which 20 had triangular shaped incisors (33.3%) and four patients had squarish incisors(6.6%). 12 patients were female patients with 10 triangular shaped incisors (16.6%) and two patients with squarish incisors(3.33%).11 patients had class II division I subdivision with 10 male patients out of which 9 had triangular incisors(15%) and one with squarish incisors(1.6%), one female patient with triangular incisors(1.6%).5 Patients with class II division II malocclusion-4 Male Patients with two squarish incisor(3.3%) and two triangular incisors(3.3%).Two Male Patients with class I malocclusion and triangular incisors(3.3%).Three female patients with class III subdivision with two triangular incisors (3.3%) and one squarish incisors(16%) (Table 2).

From the results,the most predominant shape of the incisors were triangular.This is in contrary with another similar study(Song *et al.*, 2017),which shows ovoid shape as the most predominant shape of incisors.This study observed (Song *et al.*, 2017) association between the shape of face and tooth,and the oval shape in both men and women and the triangular shape teeth was the least common for both genders. Increased incisal show is aesthetically unappealing and requires intrusion of the maxillary incisors which can be achieved by several orthodontic mechanics (Jain, Kumar and Manjula, 2014),also extraction of incisors can help minimize arch expansion, decrease the amount of tooth movement required, minimize facial change(Felicita, 2017a). Various alternative methods are used to define an individual ‘s ideal tooth contour, and although the geometric theory or its variations are widely used for selecting teeth used in dental prosthesis (Jain, Kumar and Manjula, 2014). A new innovative design - ball headed mini implant is being done to overcome various orthodontic problems is hooked in between lateral incisors and canine can also stand a chance for altering the contour of the tooth structure(Vikram *et al.*, 2017).

As a summary, the shape of the tooth is predominantly triangular followed by squarish.This is not in consensus with other studies. This can be due to various limitations of the study like single ethnic group, smaller sample size, geographic limitations.

CONCLUSION:

From this study, it can be concluded that the shape of the incisors are predominantly triangular in patients visiting the clinic for orthodontic treatment irrespective of gender and type of malocclusion.

AUTHOR CONTRIBUTION:

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CONFLICT OF INTEREST:

The authors declare no conflict of interest.

TABLES AND GRAPHS:

GENDER			TRIANGULAR	SQUARE	OVAL	TOTAL
MALE	Type of malocclusion	CLASS I	31	5	1	37
	Total		31	5	1	37
FEMALE	Type of malocclusion	CLASS I	21	2		23
	Total		21	2		23
TOTAL	Type of malocclusion	CLASS I	52	7	1	60
	Total		52	7	1	60

Figure 1: Table showing gender distribution, type of malocclusion,shape of incisors in patients of group 1.

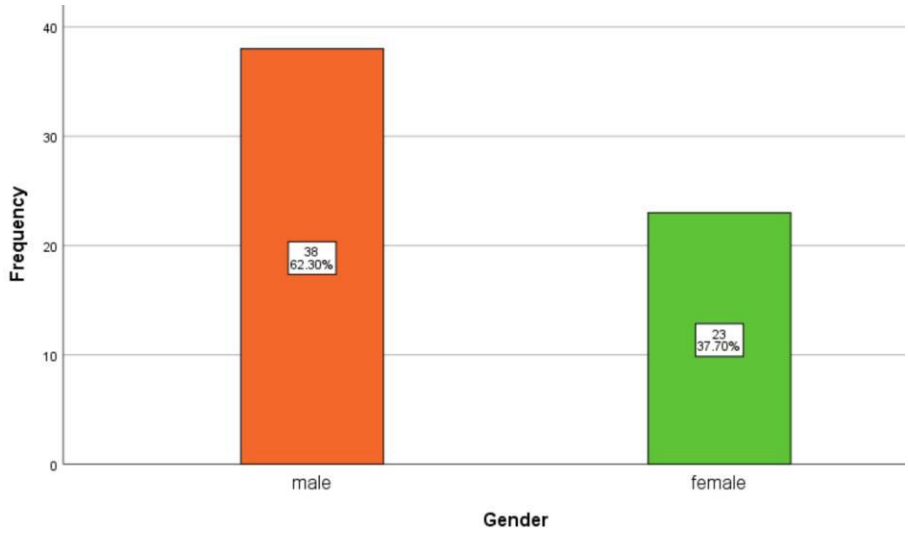

Figure 2 : Bar chart representing the frequency association of gender distribution of patients.X axis represents the gender of patient and Y axis represents the number of patients.62.30% of the individuals are male patients (orange), 37.70% of the patients were females(Green). Males are more predominant in number when compared to females.

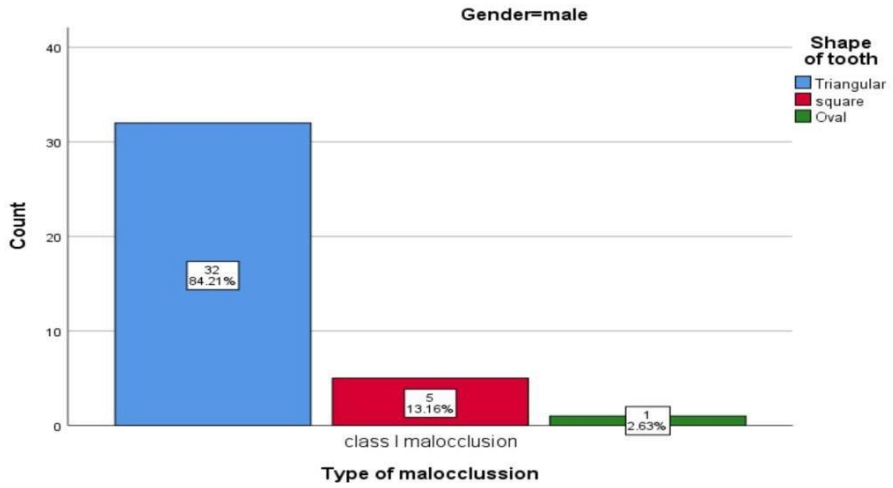

Figure 3 : Bar chart showing the prevalence of triangular, square and oval shaped incisors in class I malocclusion in male patients. X axis represents the type of malocclusion and Y axis represents the number of patients.Blue colour represents triangular shaped incisors, red colour represents squarish incisors and green colour represents oval shaped incisors. 84.21% of the patients had Triangular incisors, 13.16% of the patients had squarish incisors and 2.63% of the patients had oval shaped incisors. Triangular incisors are more predominantly seen in patients when compared to squarish and oval shaped incisors.

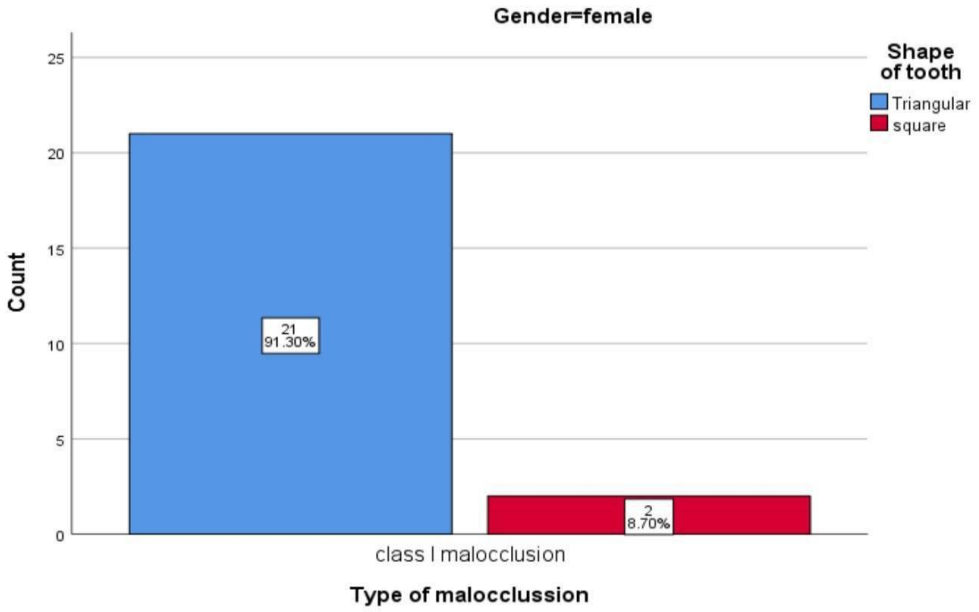

Figure 4 : Bar chart showing the prevalence of triangular, square and oval shaped incisors in class I malocclusion in male patients. X axis represents the type of malocclusion and Y axis represents the number of patients. Blue colour represents triangular shaped incisors, red colour represents squarish incisors. 91.30% of the patients had triangular shaped incisors and 8.70% of the patients had squarish incisors. Triangular incisors are more predominantly seen in female patients when compared to squarish incisors.

GENDER			TRIANGULAR	SQUARE	TOTAL
MALE	Type of malocclusion	Class III malocclusion	17	7	24
		Class III subdivision	7	2	9
		Class I	0	1	1
	Total		24	10	34
FEMALE	Type of malocclusion	Class III malocclusion	7	4	11
		Class III subdivision	5	2	7
		Class II Division I	1	0	1
		Total	13	6	19
TOTAL	Type of malocclusion	Class III malocclusion	24	11	35
		Class III subdivision	12	4	16
		Class II division I	1	0	1
		Class I	0	1	1
	Total		37	16	53

Figure 5 : Table showing gender distribution, type of malocclusion,shape of incisors among patients of group 2.

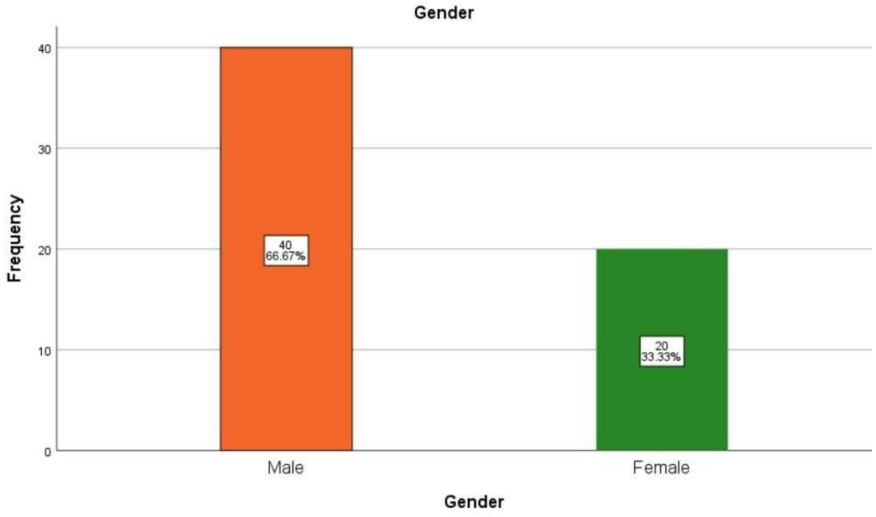

Figure 6 : Bar chart representing the frequency association of gender distribution of patients in group 2. X axis represents the gender of patients.Y axis represents the frequency of patients. 66.67% of the patients were males(Orange) and 33.33% of the patients were females (green).This chart shows the predominance of males when compared to females.

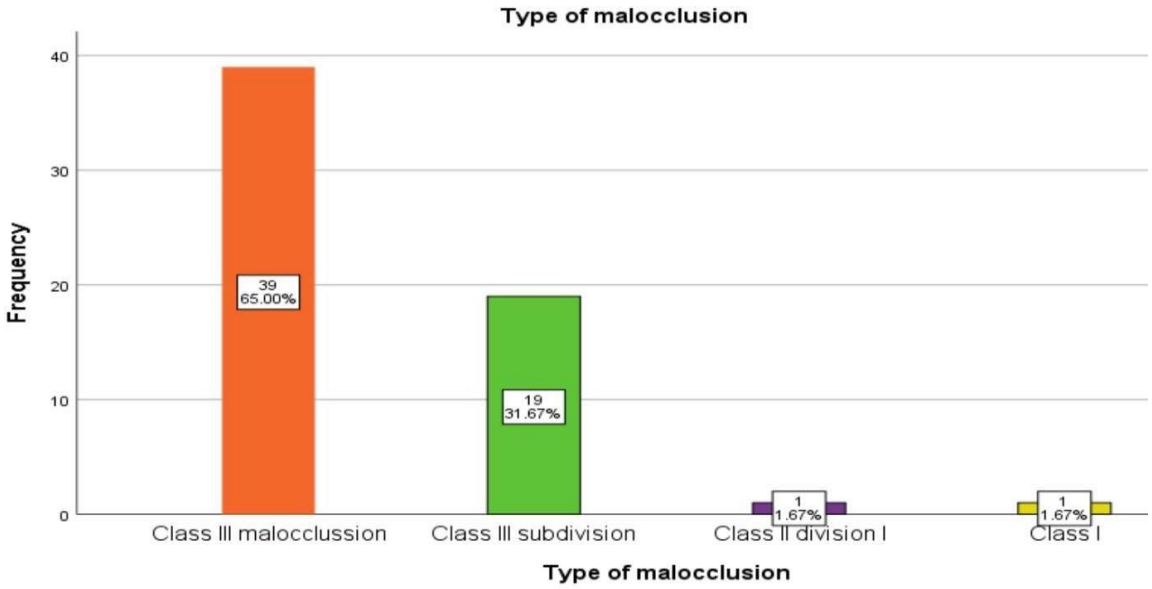

Figure 7 : Bar chart representing the frequency distribution of type of malocclusion in Group2 patients. X axis represents the type of malocclusion. Y axis represents the number of patients.65% of the patients had class III malocclusion (orange), 31.67% of the patients had class III subdivision (green), 1.67% of the patients had class II division I malocclusion (violet) , 1.67% of the patients had class I malocclusion (yellow). There is an increased number of class III patients in this group.

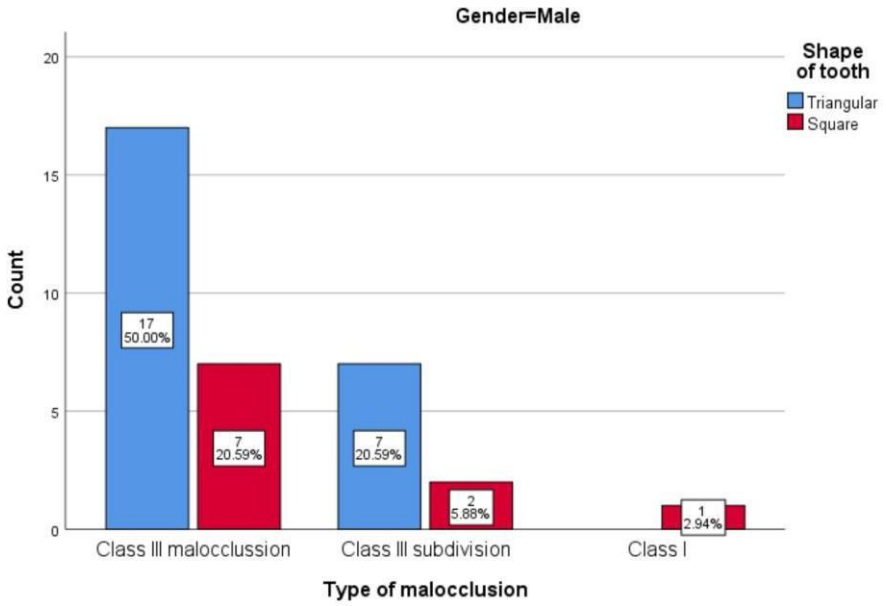

Figure 8 : Bar chart representing the association between type of malocclusion and shape of incisors in male patients of Group 2. X axis represents the type of malocclusion. Y axis represents the number of patients.Blue colour represents triangular incisors.Red colour represents square shaped incisors. There is predominance of triangular shaped incisors in all types of malocclusion except for one class I Patient with squarish incisors. On chi square analysis value was found to be 0.290 (p value > 0.005), does not show significant association.

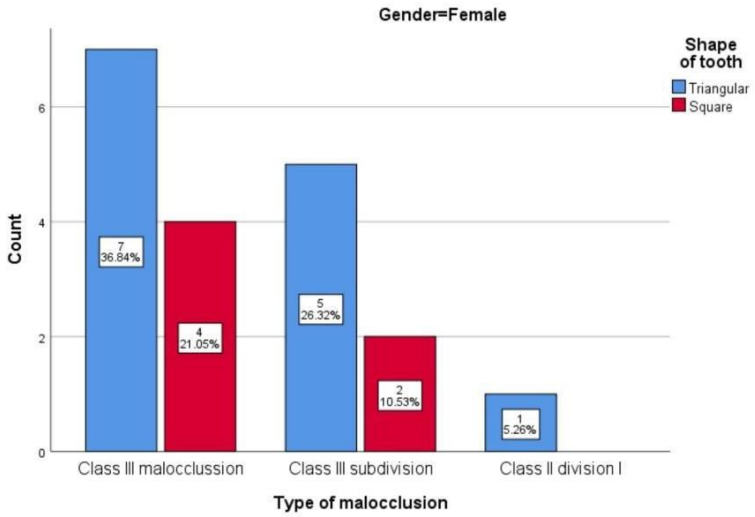

Figure 9 : Bar chart representing the correlation between the type of malocclusion and shape of incisors in female patients of Group 2. X axis represents the type of malocclusion. Y axis representing the number of patients. Blue colour represents triangular incisors. Red colour represents squarish incisors.Among all the patients with class III malocclusion, 36.84% of the females had triangular incisors and 21.05% of the patients had squarish incisors. Among patients with classIII subdivision malocclusion 26.32% of the patients had triangular incisors and 10.53% of the patients had squarish incisors. Among the patients of class II division I malocclusion, 5.26% of the patients had triangular incisors. There is a predominance of triangular incisors in this group.On chi square analysis, the value was found to be 0.356 (p value > 0.005), does not have significant association.

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