



## **Protocol for Establishing the Norms of Total Tooth Material for Central Indian Population**

**Sakshi Agrawal<sup>a\*≡</sup>, Pallavi Daigavane<sup>b⊙</sup>, Ranjit H. Kamble<sup>b#</sup>  
and Bhagyashri Chimote<sup>c†</sup>**

<sup>a</sup> Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed To Be University), Sawangi (Meghe), Wardha 442001, Maharashtra, India.

<sup>b</sup> Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College and Hospital, Datta Meghe Institute of Medical Sciences (Deemed To Be University), Sawangi (Meghe), Wardha 442001, Maharashtra, India.

<sup>c</sup> Department of Prosthodontics, V. Y. W. S Dental College and Hospital, Amravati (MH), Maharashtra, India.

### **Authors' contributions**

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

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**Study Protocol**

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## **ABSTRACT**

**Background:** Appealing profile is dependent on constructive interrelation of craniofacial structure so as to establish systemic equilibrium. An esthetic profile may also be associated with single tooth or inter-arch malocclusion. To correct these malocclusions, the corresponding link of tooth material of upper and lower arch is the prerequisite to achieve functional stability of occlusion, structural balance and esthetic harmony.

**Objectives:** To determine tooth size ratios for maxillary and mandibular dentition in Central Indian population.

**Methodology:** The study sample comprised of 500 subjects (250 males and 250 females) aged between 12-20 years with all permanent first molar erupted will be obtained from the department.

<sup>≡</sup> BDS Intern;

<sup>⊙</sup> MDS PHD Associate Professor;

<sup>#</sup> HOD and Professor;

<sup>†</sup> Reader;

\*Corresponding author: E-mail: sakshiagrwal0602@gmail.com;

The mesio–distal width of all teeth anterior to first molar of maxillary and mandibular teeth from right to left side will be calculated

**Expected Results:** Proof of sexual dimorphism was seen among Indian male subjects have greater mean values as compared to females. Statistically considerable differences were established between Indian samples and Bolton Caucasian standards.

**Conclusion:** The research presents, evidence that size of teeth are population specific. Mean values specific to peculiar population samples should be obtained in order to make treatment regime more precise as well as predictable.

*Keywords: Bolton Caucasian standard; mesio -distal width; Sexual dimorphism.*

## 1. INTRODUCTION

Appealing profile is dependent on constructive interrelation of craniofacial structure so as to establish systemic equilibrium [1]. An esthetic profile may also be associated with single tooth or inter-arch malocclusion. To correct these malocclusions, the corresponding link of tooth material of upper and lower arch is the prerequisite to achieve functional stability of occlusion, structural balance and esthetic harmony [1].

The Total Tooth Material (TTM) may vary between different racial and ethnic group that affects the facial esthetics [2]. The values of TTM is not same even in male and female of same racial group [3-5]. To formulate a treatment plan, model analysis is considered to be an essential aid. All the analysis under the model analysis to formulate a treatment protocol is solely dependent on the TTM of the particular individual.

Values for TTM were established for the Caucasians population, irrespective of gender difference. This can be considered as a greatest disadvantage while formulating an extraction protocol for male and female based on one guideline. According to the studies given in literature [6], there is an established difference between the values stated for Caucasians and Indian populations, and therefore any treatment protocol for patient, should not be dependent on particular population [7].

Taking into consideration the esthetics for the different races, the treatment protocol should be population dependent and not as per the given norms. With this hypothesis a study is planned to evaluate; if there is a difference in TTM of Central Indian population.

## 1.1 Objectives

- 1) To evaluate and codify the mesio-distal dimension for a TTM in male and female population (a new hypothesis).
- 2) To compare the obtained values of TTM in male and female with the norms given for the Caucasians population.

## 1.2 Study Design

Cross –sectional observational type.

## 2. METHODOLOGY

The study will be done in the Department of Orthodontics and Dentofacial Orthopedics, Sharad Pawar Dental College and Hospital. The sample size will be patients enrolled in the department for orthodontic treatment from age group 12 to 20 years.

Dental study casts of 500 adult patients (250 male & 250 female) with all permanent first molar erupted will be obtained from the department. The mesio–distal width of all teeth anterior to first molar of maxillary and mandibular teeth from right to left side will be calculated using a digital Vernier caliper to calculate mesio-distal width of the teeth (nearest 0.01) on study models. The values will be entered into an excel sheet.

The values obtained will be subjected to statistical analysis using student un-paired T – test and chi – square test.

The study models will be selected based on the following inclusion criteria:

1. Study models with permanent teeth present from first permanent molar from right to left side maxillary and mandibular arch.

2. Patients with parents from Central India / Vidarbha origin and residing in Vidarbha since the birth of the selected sample.

The study models will be selected based on the following exclusion criteria:

- 1) Morphological variation.
- 2) Extraction done if any.
- 3) Orthodontically treated cases with extraction.
- 4) Patient with local etiological factors with congenitally missing tooth, tooth shape, tooth number.
- 5) Study model with absence of any mesio-distal and occlusal abrasions, caries, restorations, dental prosthesis, missing teeth, tooth anomalies in size, shape and number.

To ensure measurement accuracy and to remove the evaluation bias, 2 months later, the dental casts will be re-evaluated by the same investigator and reliability test will be applied to the first and second values.

### 3. IMPLICATIONS

Establishment of the norms of TTM for male and female for Central Indian population can help orthodontists to formulate a treatment plan with or without extraction based on the model analysis.

If norms are established for a population, the need of extraction of two to four permanent premolars can be avoided; which can aid in the psychological well-being of the adolescent patients. Also to treat a case with non-extraction protocol reduces the burden of cost requiring extra tools to close the spaces which can further reduce the treatment time.

As, now the esthetic concern has changed the treatment modalities, by establishing any norms for a particular population the esthetic concern regarding the facial genotype and features with an ancient touch can be maintained rather than blindly following and treating an individual, based on the norms for other population. Evaluation of TTM can guide us further in this direction.

### 4. EXPECTED OUTCOMES/RESULTS

The TTM for male and female may have varied mesio-distal dimensions and thus the treatment

plan can be varied accordingly when the space management will be done.

### 5. DISCUSSION

One of the essential principle with which the orthodontist has to overcome within reconstructing the denture is tooth size, mainly mesiodistal width of teeth [8]. The tooth size ratios initially proposed by Bolton were based on a small group ( $n = 55$ ) of the American population and may not apply to other populations across the globe [9]. The intermaxillary tooth size ratio may vary according to heredity, ethnicity, gender, and secular trends. An acquaintance of TSD in the local population can abet the orthodontists designing a reliable treatment plan. The vastly recognized Bolton's standards refer to the Caucasian population with ideal occlusion; there is a need to establish specific standards for individual population groups with regard to normal occlusion as well as different classes of malocclusion [9]. Orthodontists should specially look after to the presence of tooth size discrepancy as sixty percent of orthodontic patients present with an anterior Bolton discrepancy [10]. Improper diagnosis to recognize this disparity can always create complications to treating cases, particularly as compared to ideal relationship of molars and canines and acquiring ideal overjet as well as overbite [11,12].

Proffit acknowledged that around Five percent out of whole population has some extent of irregularity seen in size of each tooth of individuals [13].

Smith et al.[14] interpreted that Bolton's ratios were only implemented to white females and that's why it should not be implemented to white males, blacks, or Hispanics. Smith *et al.* also affirmed that the in general ratio was considerably greater in males compared to females. Therefore, universal usage of the Bolton analysis and the recommended range for a balanced dentition are under conversation and might not be justified to remaining populations. Few of the related studies were reviewed [15-22].

### 6. CONCLUSION

The research presents, evidence that size of teeth are population specific. Mean values specific to peculiar population samples should be obtained in order to make treatment regime more precise as well as predictable.

## CONSENT

As per international standard or university standard, patients' written consent Will be collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval Will be collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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