

Comparing the Arch Forms between Mongoloid Race and Dravidian Race in 11–14-year-old Children

Shekhar Smitha¹, Priya Nagar², Raveendran Abinaya³, Jagannathan Janani⁴

ABSTRACT

Aim and objective: To compare arch forms between Mongoloid race and Dravidian race in 11–14-year-old children.

Materials and methods: Total 10 subjects from each study group were selected. Impression of both maxillary and mandibular arches were taken of all the subjects. Dental casts were poured. Inter canine measurement can be termed as the distance across two canine cusp tips, and intermolar measurement can be termed as the distance across two mesiobuccal cusp tips. This distance was recorded for maxillary and mandibular casts by making use of digital Vernier caliper. Data were tabulated.

Statistical analysis: To note the statistical impact, a Chi-square test was applied.

Results: The difference across the two groups was found to be statistically significantly noteworthy (independent *t* test $p < 0.001$).

Conclusion: Group I (Mongoloid race) showed significantly larger intercanine to intermolar width compared to Dravidian race with wide flaring arches.

Clinical significance: The size and forms of dental arches exhibit considerable variability within and among human groups. This research demonstrated that while considering Mongoloid patients, we must make use of prior formed orthodontic wires for ovoid shaped arches in a trivial fraction of patients.

Keywords: Arch forms, Dravidian groups, Ethnic groups, Inter canine width, Intermolar width, Mongoloid groups, Original research.

International Journal of Clinical Pediatric Dentistry (2020): 10.5005/jp-journals-10005-1836

INTRODUCTION

Across the globe, there are about 245 million inherent speakers of Dravidian languages. They constitute the foremost part of the South Indian population. Mongoloids are a cluster of all or few individuals aboriginal to East Asia, Southeast Asia, North Asia, the Arctic, Central Asia, the Americas, and the Pacific Islands. This population frequently share specified traits, such as epicanthic folds, sino- or sundadonty, shovel-shaped incisors, and neoteny.

The size and forms of dental arches exhibit considerable variability within and among human groups.¹ Different ethnic groups of man show variation in size and shape of the dental arch. Lavelle et al. evaluated and assessed the dental arches of adult men in four important cultural groups: Caucasoid, Mongoloid, Negroid, and Australoid. They deduced that there were particular dissimilarities in dental arch size and shape between the different populations.² Researches on other ethnic population have further reinforced these findings.

It has been portrayed that well-aligned dental arches have been nearly categorized as ovoid, square, and tapered forms by traditional studies. These arch forms can also be expressed as narrow, normal, and wide.³ In order to achieve a stable, esthetic, and functional orthodontic treatment outcome, an imperative consideration is the accurate detection of a patient's arch form. If we are unsuccessful to preserve the arch form, it possibly will add to possibility of relapse.

There have been trending advancements in elastic wire systems, materials, preformed wires, and preadjusted appliance systems predominantly in the alignment and levelling stage. Conversely, their superelastic property makes customization of arch forms and sizes challenging.⁴ To have various types of preformed arch wires accessible and select the shape that preferably matches with

¹⁻⁴Department of Pedodontics and Preventive Dentistry, Krishnadevaraya College of Dental Sciences, Bengaluru, Karnataka, India

Corresponding Author: Shekhar Smitha, Department of Pedodontics and Preventive Dentistry, Krishnadevaraya College of Dental Sciences, Bengaluru, India, Phone: +91 8904718887, e-mail: drsmitha117@gmail.com

How to cite this article: Smitha S, Nagar P, Abinaya R, et al. Comparing the Arch Forms between Mongoloid Race and Dravidian Race in 11–14-year-old Children. *Int J Clin Pediatr Dent* 2020;13(S-1):S26–S28.

Source of support: Nil

Conflict of interest: None

patient's pretreatment arch forms conferring to his or her ethnicity and the type of malocclusion appears more rational clinically.

AIM AND OBJECTIVE

The purpose of this study was to illuminate morphological disparities among Mongoloid and Dravidian maxillary and mandibular dental arch forms.

MATERIALS AND METHODS

The Dravidian cases included 20 maxillary and mandibular dental models from patients visiting Krishnadevaraya College of Dental Sciences, Department of Pedodontics and Preventive Dentistry. The Mongoloid cases included 20 maxillary and mandibular dental models from Peace Coaching Centre (residential hostel for the Mongoloid children).

All cases were subjected to the following inclusion criteria:

- Mixed dentitions with permanent canines and first molars
- Dentitions with no abnormalities in tooth size and shape
- Teeth devoid of restorations encompassing contact areas, incisal edges, or cusp tips.

The distance across two canine cusp tips, the intercanine measurement and the intermolar measurement can be termed as the distance across two mesiobuccal cusp tips that was gauged by making use of digital Vernier caliper.

STATISTICAL ANALYSIS

Data were analyzed. The normality of data for each variable was surveyed using Kolmogorov-Smirnov and Shapiro-Wilk normality tests. To inspect the disparities in arch measurements among the ethnic groups, independent *t*-tests were used. To observe the association among the ethnic group and arch shape, the Chi-square test was used. The level of significance used in our research was *p* < 0.05.

RESULTS

The arch dimension magnitudes and independent *t*-test outcomes for the ethnic Dravidian and Mongoloid are displayed in Tables 1 and 2, respectively

Table 2 shows mean intercanine and intermolar width of maxillary and mandibular arches of both the ethnic groups. Mean maxillary intercanine width of group I (Mongoloid race) is 35.10 mm, whereas mean maxillary intercanine width of group II is 32.2 mm. Mean mandibular intercanine width of group I is 27.2 mm, whereas mean width of group II is 24.8 mm. Mean maxillary intermolar width of Mongoloid race was found to be 51.7 mm whereas Dravidian intermolar width was found to be 47.7 mm. This showed that the distance from intercanine to intermolar increased more rapidly among the Mongoloid race than the ethnic Dravidian race people. Mean mandibular intermolar width of group I was found

to be 45.3 mm whereas it was 41.9 mm in group II. Comparatively, Mongoloids were found to have wider flaring arches than those in the Dravidian race.

DISCUSSION

Dravidians are people who speak any of the Dravidian languages. They are the past and present speakers of Dravidian languages. Total 245 million inborn speakers of Dravidian languages are discovered. They constitute the majority of South Indian population. Dravidian-speaking people are natives found in India, Pakistan, Afghanistan, the Maldives, and Sri Lanka.

Mongoloids are those population appropriately identified to a racial group that consist of people from certain parts of the world. They are mostly from northern, southern, eastern, central, and southeastern parts of Asia. Other than Asia, they are also located at the Arctic, the American, and the Pacific Islands. These groups consist of a high percentage of people having certain associated visible traits, such as epicanthic folds (skin folds covering the corners of the eyes) and oblique palpebral fissures, neoteny (retaining more juvenile physiological traits), and sinodonty (shovel tooth dental shape).

A few researches and their authors have described regarding dental arch forms, many of them have also tried to establish the form that are concerned to certain malocclusions, ethnic groups, and sex. Diverse landmarks have been used in research studies related to dental arch shape. Incisal edges and cusp tips are the most usually used landmarks in the study done by Burris and Harris, Ling and Wong.

Kunihoko Nojima et al. have compared Caucasian and Japanese mandibular clinical arch forms in class 1, class 2, and class 3 malocclusions. Their results presented that as compared to Japanese population, Caucasian population had a statistically noteworthy increased arch depth and decreased arch width. They inferred that among Angle's classifications or ethnic groups it appeared to be the frequency of a particular arch form that differed.⁴

Table 1: Tests of normality

	Kolmogorov–Smirnov ^a			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Maxilla ICW	0.134	20	0.200*	0.966	20	0.669
Mandible ICW	0.150	20	0.200*	0.921	20	0.104
Maxilla IMW	0.126	20	0.200*	0.917	20	0.086
Mandible IMW	0.216	20	0.015	0.896	20	0.035

*This is a lower bound of the true significance

^aLilliefors Significance Correction

Table 2: Group statistics

	Groups	N	Mean	SD	SE	mf	<i>p</i> value
Maxilla ICW	I	10	35.10	1.197	0.379	2.90	<0.001
	II	10	32.20	1.229	0.389		
Mandible ICW	I	10	27.20	2.300	0.727	2.40	0.007
	II	10	24.80	0.919	0.291		
Maxilla IMW	I	10	51.700	1.3375	0.4230	4.00	<0.001
	II	10	47.700	1.4181	0.4485		
Mandible IMW	I	10	45.30	2.452	0.775	3.40	0.002
	II	10	41.90	2.025	0.640		

Ahmet et al. evaluated arch forms amid Turkish and North American groups. The Turkish group exhibited substantially lower molar depth and more noteworthy molar width-depth (W/D) ratio in Angle's 1, 2, and III classifications. This was noticed by him in his research. A considerably larger intercanine width in class 3 malocclusion and intermolar width in class 2 malocclusion was discovered. The ovoid arch form in the Turkish group and the tapered form in the white group were the most commonly seen.³

The difference of the arch form concerning ethnic Malays and Malaysian Aborigines in Peninsular Malaysia has been computed by Siti et al. Their outcome was that the ovoid arch forms were the highly regular maxillary arch forms in either of the ethnic groups. As there were no trivial disparities among the arch shapes and dimensions of the ethnic groups of the study, it was concluded there were no disparities among the study groups.⁵

Evaluation of mandibular arch forms among Korean and Vietnamese patients by utilizing facial axis points on three dimensional models was made by Kil-jun Lee et al. that a substantially greater intercanine depth, intercanine and intermolar width to depths ratios compared to the Koreans. In comparison to Korean population, Vietnamese have an affinity to have wider and deeper arches. There are three arch forms that are equally distributed in Korean people, while the Vietnamese population most oftenly had square arches.⁶

The present study was chosen because India has a diverse population and population is not confined to their native region. The people have been migrating as a result of work and shelter. Comparison was chosen because Dravidians form the major part of our country's population.

Mongoloids possess a parabolic arch with larger incisors, canines, smaller premolars, and large molars behind them were found as ordinary. Nambiar et al. highlighted this as an instruction particularly in the lower arch.⁷

Regardless of the Angle classification, the Dravidians exhibited narrower arch forms than those of the Mongoloids, with almost 3 mm less mean intercanine width and 4 mm less intermolar width.

The dental arch is the most focal part of modern dentistry for innumerable reasons. An initial discovery and prevention of malocclusion is one of the chief reasons why dentists hope to ensure an ideal and normal permanent dentition.⁸

In orthodontic diagnosis and treatment planning, the space available, dental esthetics, posttreatment dentition stability, and the size and shape of dental arches have suitable consequences.⁹

Distinct ethnic groups and genders may present with wavering dental arch widths, shapes, and sizes. For the purpose of ascertaining the most suitable form of arch wire prior to commencement of orthodontic treatment or interceptive treatment, clinicians must requisite to recognize the arch form of patients before the commencement of treatment.¹⁰

For evaluation of the total measurement of both the maxillary and mandibular anterior dentition, intercanine width operates as a foundation. We established statistically trivial ethnic dissimilarities in intermolar width among ethnic Dravidian and Mongoloid races.

In our research study, the mesiobuccal tips of the cusps of first permanent molar have been used as the reference points. There are currently no studies that have compared measurements using various dental landmarks nevertheless.

CONCLUSION

The dental arch form has no single and universal form. This research demonstrated that while considering Mongoloid patients, we must make use of preformed ovoid arch form orthodontic wires in a trivial fraction of patients.

CLINICAL SIGNIFICANCE

We hope that the arch form categorization will stipulate as a clinical guide in constructing and fabricating preformed arch wire forms for the Mongoloid population.

REFERENCES

1. Cassidy KM, Harris EF, Tolley EA, et al. Genetic influence on dental arch form in orthodontic patients. *Angle Orthod* 1998;68(5):445–454.
2. Lavelle CL, Foster TD, Flinn RM. Dental arches in various ethnic groups. *Angle Orthod* 1971;41(4):293–299.
3. Celebi AA, Keklik H, Tan E, et al. Comparison of arch forms between Turkish and North American. *Dental Press J Orthod* 2016;21(2):51–58. DOI: 10.1590/2177-6709.21.2.051-058.oar.
4. Nojima K, McLaughlin RP, Isshiki Y, et al. A comparative study of Caucasian and Japanese mandibular clinical arch forms. *Angle Orthod* 2001;71(3):195–200.
5. Othman SA, Xinwei ES, Lim SY, et al. Comparison of arch form between ethnic Malays and Malaysian aborigines in peninsular Malaysia. *Korean J Orthod* 2012;42(1):47–54. DOI: 10.4041/kjod.2012.42.1.47.
6. Lee KJ, Trang VT, Bayome M, et al. Comparison of mandibular arch forms of Korean and Vietnamese patients by using facial axis points on three-dimensional models. *Korean J Orthod* 2013;43(6):288–293. DOI: 10.4041/kjod.2013.43.6.288.
7. Yaacob H, Nambiar P, Naidu MD. Racial characteristics of human teeth with special emphasis on the mongoloid dentition. *Malays J Pathol* 1996;18(1):1–7.
8. Muhamad A-H, Nezar W, Azzaldeen A. The curve of dental arch in normal occlusion. *Open Sci J Clin Med* 2015;3(2):47–54.
9. Hussein KW, Rajion ZA, Hassan R, et al. Variations in tooth size and arch dimensions in Malay school children. *Aust Orthod J* 2009;25(2):163–168.
10. Louly F, Nouer PR, Janson G, et al. Dental arch dimensions in the mixed dentition: a study of Brazilian children from 9 to 12 years of age. *J Appl Oral Sci* 2011;19(2):169–174. DOI: 10.1590/S1678-77572011000200014.