

Dental Arch Circumference of Nepalese Adults: A Dimorphic Study

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ABSTRACT

Introduction: Dental arch circumference or arch perimeter is described as the curve measured from the mesial surface of the first permanent molar around the arch over the contact points and incisal edges to the mesial surface of the first permanent molar of the opposite side. There is wide range of variability in the arch circumference, which is the most important of all dental arch dimensions. Evidence shows considerable variation in size and form of the dental arches between the sexes and among the races.

Objective: To analyze the difference between the dimensions of dental arch circumference of Nepalese adult males and females.

Materials and Method: Maxillary and mandibular dental casts of 100 Nepalese adults aged 17 to 32 years of equal female to male ratio were included in the study. The differences between the dimensions of dental arch circumference was analyzed using the measurement method described by Moyers. The measurement was performed using soft Brass wire (0.020") adapted across the anatomical landmarks on the dental casts. The mean arch circumferences were analyzed for the statistical difference between the sexes.

Result: The mean maxillary and mandibular arch circumference of the Nepalese males was significantly greater than the females.

Conclusion: Sexual dimorphism in arch circumference warrants consideration of different arch-wires to be used in different orthodontic patients.

Keywords: Dental arch circumference; Nepalese adults; orthodontic treatment.

INTRODUCTION

According to Moyers, arch circumference is the most important of all dental arch dimensions. A wide range of variability is seen in circumferential increments and the maxillary and mandibular perimeters behave differently. The reduction in arch circumference takes place considerably during transitional and early adolescent dentition. In adults, the role of proximal caries, inter-

proximal tooth-attribution, differential maxillo-mandibular skeletal growth, and late incisor crowding may partly attribute to the reduction in arch perimeter.^{1,2}

Historically, Hawley³ proposed a geometric method for determining the dental arch for orthodontic purpose using the ideas of Bonwill.⁴ Sicher described the form of the upper arch as elliptic, while that of the lower arch as parabolic.⁵ MacConaill and Scher described dental

arch to the conformity of the catenary curve.⁴

Genetic variations show strong influence on arch forms and dimensions. Environmental similarities, on the other hand are more important for occlusal variables such as overjet, overbite, molar relationship, and crowding.⁷ The variations in arch dimensions have been recognized with secular changes and differences have been sought among the modern population and aborigine samples⁸ Several studies also reported considerable variations in size and form of the dental arches between the sexes and among the races.

MATERIALS AND METHOD

The materials used in the study consisted of maxillary and mandibular dental casts of one hundred subjects of equal female to male ratio. All samples were Nepalese citizen and ethnicity. The study followed non-probability purposive sampling procedure. The sampling was based on inclusion criteria established for the research. The samples possessed all permanent teeth (with or without third molars), Angle's Class I molar and canine relations, normal overjet and overbite, and symmetrical arch forms. The subjects were excluded from the study if they

possessed marked proximal or occlusal attrition, dental crowding and spacing or diastema.

The measurements were made on dental casts using soft Brass wire of 0.020" (model no. 572-050, Dentaaurum) and Boley gauge (Munchner model No. 042-721-00, Dentaaurum) of 0.1 mm accuracy. Arch circumference were measured around the maxillary and mandibular arches over the contact points of the posterior teeth and incisal edges of the anterior teeth in a smoothed curve across the contra-lateral first molars as described by Moyers (Figure: 1). The measurement was performed using soft Brass wire adapted across the anatomical landmarks on the dental casts. The Brass wire was marked with marking pen then measured using the Boley gauze. The mean arch circumferences were analyzed for the statistical difference between the sexes.

RESULT

Table 1 shows the descriptive statistics for arch circumference of Nepalese adults. The mean maxillary and mandibular arch circumferences of the Nepalese males were significantly greater than the females at $p < 0.05$ (Table 2).

Table 1: Descriptive statistics for the arch circumference of Nepalese female, male and combined females and male (in mm).

	Female			Male			Total		
	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.	Range
Mx	74.63	3.34	16.80	76.36	3.57	15.80	75.50	3.35	18.70
Md	63.37	2.87	13.30	64.84	3.62	14.00	64.10	3.33	15.50

Table 2: t-Test of statistics for the differences between the arch circumference of Nepalese females and males.

	Female		Male		p-value	Significance
	Mean	S.D.	Range	Mean		
Mx	74.63	3.34	76.36	3.57	0.014	*
Md	63.37	2.87	64.84	3.62	0.027	*

DISCUSSION

Information concerning dental arch dimensions in human population is of importance to clinical dentistry as well as to other sciences such as Anthropology, Anatomy and Forensic odontology. In Orthodontics, the diagnosis and treatment of malocclusions require accurate knowledge of arch forms, arch dimensions, and tooth dimensions. These variations in the dentition must be considered in clinical orthodontic practice. In Prosthodontics, the results may be useful particularly for selecting and designing arch forms in setting-up teeth for edentulous patients.

The sexual dimorphism in dental arch dimensions has been reported in various studies. Bishara,⁹ Laine,¹⁰ Barrett,¹¹ Knott¹² found that the males had tendency for wider dental arches. Among the studies on Nepalese samples, Shrestha found wider dental arch width¹³ and wider mesio-distal tooth dimensions¹⁴ in Nepalese males compared to the female counterparts.

CONCLUSION

Sexual dimorphism in arch circumference as reported in the present study warrants consideration of differently shaped arch forms and arch-wires to be used in different orthodontic patients.

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