Estimation of Arch Width in first Permanent Molar Tooth in the Normal Occlusion in Bangladeshi Population

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ABSTRACT

Objective: To estimate the arch width in first permanent molar tooth in the normal occlusion of Bangladeshi population.

Method: This cross sectional study was conducted among the students of Dhaka Dental College & Hospital, Mirpur-14, Dhaka-1206. Total number of subjects were hundred, among them fifty were male and fifty were female .Mean age was 23.3 years. The study was conducted from October-2004 to September -2007.

Results: The inter molar arch width in male upper jaws were 36.15mm, 43.45mm, 53.82mm respectively and in lower jaw these were 27.2mm, 36.01mm and 46.55mm. The transverse values in female upper jaw were 34.01mm , 41.26mm 51.43mm respectively and in lower jaw these were 26.12mm , 33.84mm and 44.31mm.

Conclusion: The idea of a single arch width could not be substantiated in the study. But the result of the study might help clinicians to define normal arch width and their variations more precisely. However, there are scopes left for the researchers to work further over the issue. (Ban J Orthod & Dentofac Orthop, April 2011; Vol-1, No. 2, 5-8)

INTRODUCTION

Occlusion of the teeth means the relationship which the teeth of one arch occlude to the teeth of the other arch when the jaws are closed into maximum cuspal occlusion. An occlusion which satisfies the requirements of function and aesthetics, even though there may minor irregularities of individual teeth, may be accepted as normal occlusion[1]. The key teeth for this classification are the permanent first molars. The mesiobuccal cusp of the first molar should occlude in mesiobuccal groove of the mandibular first permanent molar. Normal occlusion usually involves occlusal contact, alignment of teeth, over jet, overbite, arrangement and relationship of teeth between the arches and relationship of teeth to osseous structures. It should include not only a range of anatomically acceptable values but also physiological adaptability[2]. Normal occlusion of the dentition exhibits a range of values of the arch width. The range of these values depend on various factors, such as-height, weight, sex, race ,food habit ,morphological pattern of dentition, etc. The values of these measurement change through out the dentition .On examination of the deciduous and permanent dentition, arch width increases.[3,4] In permanent dentition, these changes appear to develop most rapidly in teens and twenties. After twenty these change were minimum. Variation of these measurements cause malocclusion. According to Ashley-crowding occur due to deficiency in arch width than arch length.[6,7] Thus this study helps in classification, diagnosis and treatment planning of the various type of Orthodontic problem pattern of dentition.

MATERIAL AND METHOD

A cross sectional type of study carried out to evaluate the " arch width in first permanent molar region in normal occlusion" based on Ashley Howe's analysis, Bolton analysis, Carey's analysis and Pont's analysis. The study was carried out in the Department of orthodontics, Dhaka Dental College and hospital, Mirpur-14, Dhaka-1206. The eligible samples were those who were diagnosed as a normal occlusion. The samples were the student of Dhaka Dental College and the mean age of samples were23.3 years.

All subjects were selected for this study according to the criteria of normal occlusion. The inclusion criteria were as follows: Angle class-1 molar relationships, Overbite 4mm, Over jet 3mm, a full complement of permanent teeth and minimal total arch crowding or spacing (<3mm). Minimal rotation and minimal attritions. Without midline deviations. Total duration of study was from October 2004- September-2007.

Study Procedure: Each of the sample was evaluated by clinical examination and model analysis. The record of 50 female and 50 male sample were selected. All measurement were recorded. The parameters measured were defined as follows:

Arch width at molar region: Arch widths were measured from Central fossa of the right sided first permanent molar to central fossa of the left sided first permanent molar. Mesio buccal groove of the right sided first permanent molar to mesio buccal groove of the left sided first permanent molar and tip of the mesio buccal cusp of right sided first permanent molar to the mesio buccal cusp of the left sided first permanent molar.

Methods of data collection: All data were collected from each sample according to the study procedure, in respect of inclusion criteria. After collection of data, the obtained data were checked, verified, edited and coded. The data were entered into a personal computer using the program SPSS. Entered data were cleaned, edited, and appropriate statistical test were done depending on the distribution of the data.

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RESULTS

This study was conducted among 100 students of Dhaka Dental College & Hospital. The occlusion of these student were normal occlusion. Among them fifty were male students and fifty were female students. The age ranges of this students were from 20 to 25 years.

Inter molar arch width (mesiobuccal cusp tip): In upper jaw the mean value in the mesiobuccal cusp tip in case of male was 53.82mm with standard deviation (±) 2.92mm and in lower jaw, mean value was 46.55mm with standard deviation (±) 3.61mm. In case of female, in upper jaw the mean value was 51.43mm with standard deviation (±) 3.07and in lower jaw the mean value was 44.31mm with standard deviation (±) 2.74mm.

Inter molar arch width (from central fossa to central fossa): The mean value of upper jaw in malesample was 49.18mm with standard deviation (±) 2.14mmand in lower jaw, the mean value was 42.87mm with standard deviation (±) 2.39mm. In case of female,the mean value was 47.58mm with standard deviation (±) 1.99mm and in lower jaw,the mean value was 41.50mm with standard deviation (±) 1.97mm.

Inter molar arch width (Buccal groove): The mean value of upper jaw, in case of male was 56.50mm with standard deviation (±) 2.23mm and in lower jaw, the mean value was 49.78mm with standard deviation (±) 2.31mm. In case of female, the mean value was 54.42mm with standard deviation (±) 2.18mm and in lower jaw, the mean value was 47.78mm with standard deviation (±) 1.85mm.

Table; I: Inter molar arch width(mesio buccal cusp tip)

Parameter	Male		Female	
	Mean (mm)	SD (mm)	Mean (mm)	SD (mm)
Upper jaw inter molar arch width from mesio buccal cusp tip	53.82	(±)2.92	51.43	(±)3.07
Lower jaw inter molar arch width from mesio buccal cusp tip	46.55	(±)3.61	44.31	(±)2.74

Position wise inter molar arch width mesio-buccal cusp tip first molar (L66)
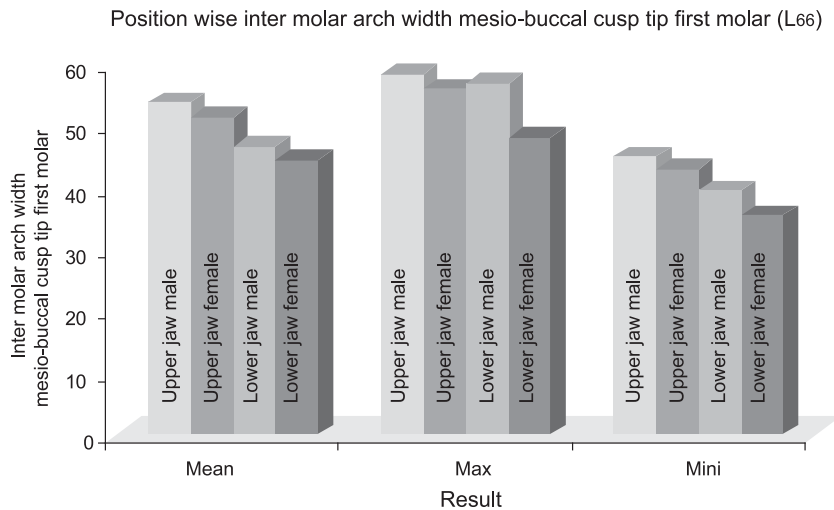

Fig 1: Position wise inter molar arch width -mesiobuccal cusp tip first molar

Table II: Inter molar arch width (central fosse to central fossa)

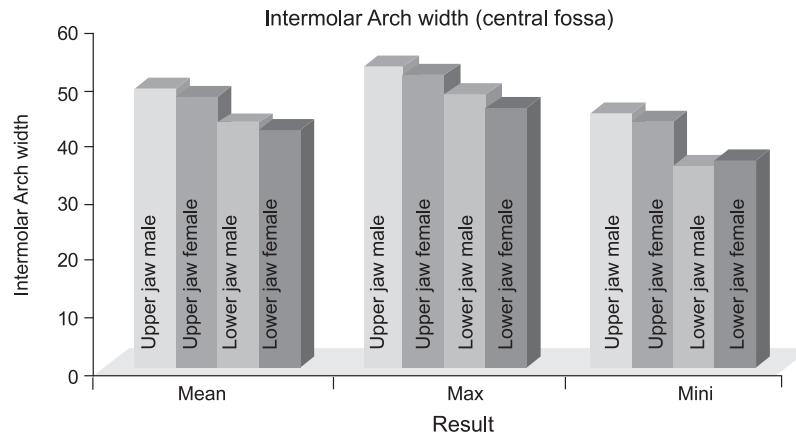| Parameter	Male		Female	
	Mean (mm)	SD (mm)	Mean (mm)	SD (mm)
Upper jaw intemolar arch width from central fossa to central fossa	49.18	(±)2.14	47.58	(±)1.99
Lower jaw intemolar arch width from central fossa to central fossa	42.87	(±)2.39	41.50	(±)1.97

Fig.2: Intermolar Arch width central fossa

Table; III: Inter molar arch width (Buccal groove molar):

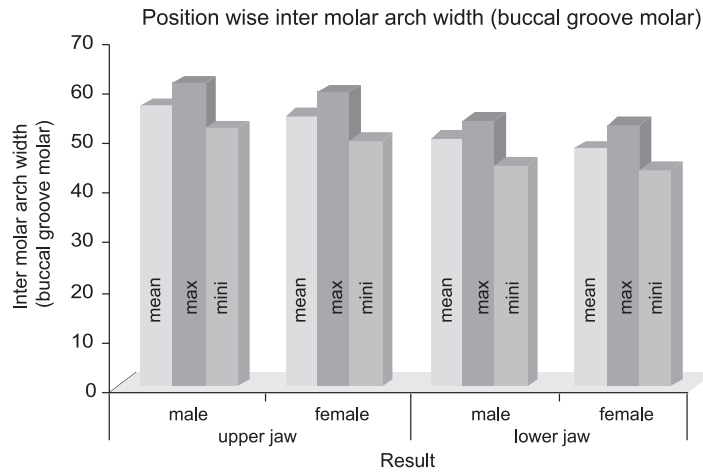| Parameter	Male		Female	
	Mean (mm)	SD (mm)	Mean (mm)	SD (mm)
Upper jaw intemolar arch width	56.50	(±)2.23	54.42	(±)2.18
Lower jaw intemolar arch width	49.78	(±)2.31	47.78	(±)1.85

Fig3: Position wise inter molar arch width (buccal groove molar)

DISCUSSION

This cross sectional type of study was conducted in the Department of Orthodontics and Dentofacial Orthopedics, Dhaka Dental College and Hospital, Mirpur - 14, Dhaka, to estimate arch width in molar region in normal occlusion. The subject of this study was selected from students of Dhaka dental college. This study correlated with the previous study conducted among the Saudi and Egyptian population sample[15]. This study was also correlate with the study result found among the Indonesian's sample. But, this result was significantly lower than the Australian aborigines sample with same criteria.[16] This may be due to diet, environmental factors, or physical characteristics that present in the population.

The first molar l arch width along the mesiobuccal cusp tip on the occlusal surface in male upper jaw was 38.39± 2.06mm and in lower jaw this value was 46.55± 3.61mm and in case of female this was 44.31± 2.74mm . This result was significantly lower than the Australian aborigines and Indonesian sample[7] All the arch width along the permanent first molar both in upper and in lower jaw were greater in male sample than in female samples. These values were lower than the previous study done on American black and white population.[13]

CONCLUSION

The idea of a single arch width could not be substantiated in these sample of untreated adults with a normal occlusion. But the results obtained from this preliminary study may be regarded as a milestone in the field of Orthodontic research in Bangladeshi context, which might help the Orthodontists, researchers and relevant practitioners for an effective clinical decision. The Orthodontist who is cognizant and aware of these possible differences while evaluating arch width, will be better prepared to diagnosis and plan treatment more accurately. However, further similar studies are recommended to establish the validity of the work.

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