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Morphological characteristics of primary dentition in 3 -5yr old school going children of Chidambaram and Srinagar in anterior teeth

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Abstract

Introduction: The present study was conducted to provide the normative data on the mesio-distal and bucco-lingual crown measurements in 3 – 5yr old school going children between Chidambaram and Srinagar.

Material and methods: In this study two hundred children were randomly selected from the population of Chidambaram and Srinagar schools based on the inclusion criteria during initial dental screening. During the second visit maxillary and mandibular impressions were made by principal examiner with alginate [neocolloid] in the room provided by the school authorities. In the present study a digital caliper was used to measure the mesiodistal and the bucco-lingual dimensions of the teeth. Measurement of following five teeth on each side in both the dental arches was recorded in the Performa along with their name, age and sex.

Results: The present investigation found that male teeth were larger than female in both group one and group two except for lower lateral incisors. It is the y – chromosome that seems to contribute in the size of the teeth by controlling the thickness of dentine, whereas x – chromosome seems to be responsible for modulating thickness of enamel. The sexual dimorphism in the tooth morphology is also attributable to the presence of relatively more dentine of the crowns of male teeth. The tooth dimensions were larger for Srinagar children [North] compared to Chidambaram children [South].

Conclusion: The importance of the tooth measurements and it's application in diagnosis and clinical dentistry has been well emphasized in the past. Some of more common types of the malocclusion are basically due to the discrepancy between the tooth material and the size of the dental arches. This discrepancy may be reflected clinically as crowding of the teeth, if the combination of excessive tooth material and a short dental arch length exists. On the other hand, it may result in spacing and diastema between teeth if the arch length is more and the tooth material is less. In either case, it is a space problem, which is of great interest to general dentist, as well as to the pedodontist and orthodontist in diagnosis and treatment planning. The tooth size ratio also contribute great deal to balanced occlusion, facial harmony and esthetics. Since very less studies on the measurements of the tooth size have been made in India further studies should be carried out all over India.

Keywords: Primary dentition, mesiodistal, buccolingual and anterior teeth

Introduction

Tooth size ratio represent a valid diagnostic tool that allow for an educated prediction of treatment outcomes and may also limit the necessity for the diagnostic setup for complex cases [1]. It is essential for the clinicians to know the size of individual tooth, and groups of teeth to make an acute diagnosis and treatment plan [2]. Treatment planning should always be taken into consideration on discrepancy of tooth size ratios and should include compensating esthetic procedures such as esthetic bonding, prosthetic reconstruction, stripping and crown recontouring [1]. Primary teeth are an important unit of study, since they are not simply scaled-down versions of their longer-performing successors. Instead, their distinctive sizes and morphologies vary within and among populations and through time [3]. Teeth are excellent material in living and non-living population for anthropological, genetic, odontologic and forensic investigations. These exhibit least turnover of natural structure and are readily accessible for examination. Since they are the hardest and chemically most stable tissues in the body they are chemically preserved and fossilized, thereby providing by far the best record for

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evolutionary change [4]. During forensic and archeological excavations, it is often the case that not all the bones of the individual are collected. Therefore, the skull and the teeth provide the teeth often provide the only identification material [5]. As compared to other ethnic groups, very less studies on measurements have been made in India [3]. The present study was conducted to provide the normative data on the mesio-distal and bucco-lingual crown measurements in 3 – 5yr old school going children between Chidambaram and Srinagar.

Material and methods

The present study was planned in the department of Pedodontics and Preventive Dentistry, Rajah Muthiah Dental College and Hospital, Annamalai University to compare the morphological characteristics of primary dentition in children of Chidambaram and Srinagar. In this study 200 children were randomly selected from the population of Chidambaram and Srinagar schools based on the inclusion criteria. Among these 100 children were selected from Chidambaram and 100 children from Srinagar ranging from 3 – 5yrs age group. 4 schools in Chidambaram and 6 schools in Srinagar were included in this study. Informed consent was obtained from the parents, school authorities and was approved by Dean, Rajah Muthiah Dental College and Hospital.

Inclusion criteria

- Children with complete set of the deciduous dentition.
- Age of the children between 3 – 5yrs.
- No obvious loss of the tooth material mesio-distally or bucco-lingually as a result of carious tooth loss or excessive tooth wear.
- Only fully erupted deciduous teeth were measured.
- No congenital absent or deformed teeth were present.
- All the children who fulfilled the inclusion criteria were identified during the initial dental screening and were recorded. During the second visit maxillary and mandibular impressions were made by principal examiner with alginate [neocolloid] in the room provided by the school authorities. The impressions were washed with water and models were poured with dental plaster immediately.
- A digital caliper was used to measure the mesiodistal and the buccolingual dimensions of the teeth. Measurement of following 5 teeth on each side in both the dental arches was recorded in the performa along with their name, age and sex. The teeth measured were then statistically analysed.

Results

There was a significant difference in the mesio-distal diameter of upper central incisors between group -1(Chidambaram) and group -2(Srinagar). It was more for group-2 than group-1.

There was a significant difference in the mesio-distal dimensions of upper central incisors and canines between group -1 (Chidambaram) and group -2(Srinagar). It was more for group 2 than group -1.

There was a significant difference in the bucco-lingual dimension of upper central incisor between group -1(Chidambaram) and group -2 (Srinagar). It was more for group 2 than group -1.

The bucco-lingual dimension of lower incisors and canine were more for group 2 than group -1. There was no significant difference in the mesio-distal dimension of upper incisors and canines between male and female of group – 1.

The mesio-distal dimension of lower lateral and canine was

more for males compared to females in group -1.

The bucco-lingual dimension of upper incisors and canines and molars was more for males compared to females in group -1. There no significant difference in the bucco-lingual dimension of lower incisors, canines and molars between males and females in group -1.

The mesio-distal dimensions of upper incisors were more for males than females among group 2(Srinagar).

The mesio-distal dimension of lower central incisor was more for male compared to female in group -2(Srinagar).

The bucco-lingual dimension of upper central incisor was more for males compared to females in group -2. There was no significant difference in the bucco-lingual dimension of lower incisors and canines between males and females in group - 2.

Discussion

Numerous studies have indicated a strong genetic influence in determination of tooth dimensions. It has been reported that the tooth morphology and the dimensions change with human evolution due to technological, environmental and dietary changes. Now it is widely accepted that both genetic and the environmental factors affect the tooth dimensions.

The present study was conducted to provide the normative data on the mesio-distal and bucco-lingual crown measurements in 3 – 5yr old school going children between Chidambaram and Srinagar. Informed consent was obtained from the parents, school authorities and was approved by Dean Rajah Muthiah Dental College and Hospital. All the children who fulfilled the inclusion criteria were identified during the initial dental screening and were recorded. In this study 200 children were randomly selected from the population of Chidambaram and Srinagar schools based on the inclusion criteria. 100 children were selected from Chidambaram schools and 100 children from Srinagar schools ranging from 3 – 5yrs age group. 4 schools in Chidambaram and 6 schools in Srinagar had participated in this study.

The present investigation found that male teeth were larger than female in both group 1 and group 2 except for lower lateral incisors. The result of this study agree with those of Keith. K.W. Yuen [1997] [6], among Hongkong Chinese according to which the size of the teeth in males were more than that of females, except the lower two central incisors. According to Arnet. A. Anderson [2005] [7], among African American male teeth were larger than female ie: 3.5% in maxilla and 3.2% in mandible. According to Coenraad. F.A. Moorees *et al* [1957], among North America the tooth crowns of males are broader than females. According to E.S.J.ABU. Ahaja [2003] [8], among Irbid, Jordan, the mesio-distal width of upper first molar in males was 0.21mm larger than in females.

Dimensions of Incisors

Mesio-distal dimension of upper central Incisor in Chidambaram

In Chidambaram the mesio-distal dimension of upper incisor was 6.6mm and there no significant difference between males [6.7mm] and females [6.5mm]. This was similar to Koora. k [2010] [21] in Hyderabad population [6.6mm] and Chennai population [6.7mm]. These results were also similar to Arnet. A. Anderson [2005] [4] in African American population in which male children was [6.7mm] and female children was [6.5mm]. In contrast to European Americans who had smaller size incisors ie: male children [6.4mm] and female children [6.5mm].

The results were also similar to Hung Tsai [2001] [9] in

Taiwan population where male children dimension was [6.7mm] and female children dimension was [6.6mm]. The results were also similar to findings of Yoshikazu Kitagawa [2002]^[10], where Edo sample was [6.6mm] and in Modern Japanese wa [6.6mm].

Bucco-lingual dimensions in upper central incisor in Chidambaram

The bucco-lingual width of upper incisors in group -1 was [5mm] and was more for male children [5.2mm] compared to females children [4.8mm]. This was similar to Koora. K [2010]^[4] in which female children dimension was [5.3mm] in Hyderabad population.

Mesio-distal dimension of upper central Incisor in Srinagar

The mesio-distal dimension of upper central Incisor was more in Srinagar children [6.87mm] compared to Chidambaram children [6.6mm], and it was more in male children [7mm], compared to the females children [6.7mm] in group 2. These results were similar to Koora.K [2010]^[4], [6.7mm] in Chennai population where a digital calliper was also used for the measurements of teeth and among this the values obtained were [6.9mm] for boys and [6.7mm] for girls. The results were also similar to the findings of Yoshikazu Kitagawa *et al* [2002]^[10] which was [6.7mm], in Medieval sample.

Bucco-lingual dimensions in upper central incisor in Srinagar

The bucco-lingual width of upper central incisor was more for group 2 [5.4mm], compared to group 1 [5mm]. This was similar to Koora. K [2010]^[4] findings of Chennai populations [5.3mm].

The bucco-lingual dimensions in upper central incisor was more for male children [5.5mm] compared to females children [5.3mm] in group 2. These findings were similar to Koora. K [2010]^[4], in which bucco-lingual dimension of upper incisors in males children was 5.4mm and females children was 5.2mm.

Mesio-distal dimension of Lower central Incisor

The mesio-distal dimension of lower central incisor in Chidambaram was [4mm] and among which males children dimension was [4mm] and females dimension was [3.9mm]. This was similar to the results of Koora. K [2010]^[4] in Hyderabad population [4.1mm] in which dimension of the males children was [4.2mm] and females was [4mm]. This was also similar to Keith. K.W. Yuen [1997]^[11] in Hong kong Chinese in which male children dimension was [4.1mm] and female children was [4.2mm]. This was also similar to Arnet. A. Anderson [2005]^[12] where the dimensions for male children was [4.2mm] and for female children was [4mm] in African American population. Also the dimensions for males children was [4mm] and for females children was [4.1mm] in European American population. This was also similar to Hung Huey Tsai [2001]^[9] in which dimensions for males children was [4.2mm] and for females children was [4.1mm] in Taiwan population. This was also similar to the findings of Yoshikazu Kitagawa [2002]^[10] where dimensions was [4.2mm] for Medieval, [4.2mm] for Edo sample and [4.2mm] for Modern Japanese.

The mesio-distal diameter of lower central incisor was more in Srinagar children [4.3mm], as depicted in table- 2 compared to Chidambaram children: [4mm]. These values were similar to Koora.K [2010]^[4] [4.2mm] of Chennai

population. The results were also similar to the results of Yoshikazu Kitagawa [2002]^[10] of Medieval sample [4.2mm], Edo sample [4.2mm] and Modern Japanese [4.2mm] The mesio-distal diameter of lower central incisor was more in males children [4.4mm] compared to 4.2mm in females children.

Bucco-lingual dimension of Lower central Incisor

The bucco-lingual dimension of Lower central Incisor in Srinagar children was more than Chidambaram children. Also there was no statistical significance between males children [3.8mm] and females children [3.7mm] in group-1 as depicted in table -8 as well as between the males children [4.5mm] and females [4.1mm] in group -2.

The results of group -2 were similar to Koora.K [2010]^[4] [4.2mm] in Chennai population.

The results of group-1 were similar to the findings of Yoshikazu. Kitagawa [2002]^[13] [3.75mm] for Medieval sample, [3.7mm] for Edo sample and [3.7mm] for Modern Japanese. These results were also similar to Hung Huey Tsai [2001]^[9] of Taiwan population [3.8mm].

Dimension of upper lateral Incisor

The mesio-distal dimension of upper lateral was same for group-1 and group-2 was same ie [5.3mm].

The mesio-distal dimension of upper lateral was more in male children [5.4mm] compared to females [5.2mm] in group -2, but there was no statistical significance between the males and females children of group-1.

This was similar to the values of Koora.K [2010]^[4] in which the values for female was [5.4mm] in Chennai population. Also in Hyderabad population male [5.5mm] and female [5.3mm]. Similar finding were obtained by Keith. W. Yuen [1997]^[11] for male [5.4mm] and female [5.4mm]. These findings were also similar to Arnet. A. Anderson [2005]^[12] in African American population in which male 5.4mm] and female [5.3mm]. These findings were also similar to Hung Huey Tsai [2001]^[9] in Taiwan population where male children [5.5mm] and female children [5.3mm]. These findings were also similar to Yoshikazu. Kitagawa [2002]^[13] [5.5mm] in Medieval sample, [5.4mm] in Edo sample, and [5.5mm] in Modern Japanese. These findings were also similar to Coenraad. F.A.Moorrees [1957]^[14] [5.3mm], in Northpopulation.

Dimension of lower lateral Incisor

There was no statistical significance in the mesio-distal dimension of lower lateral between group-1 and group-2. The mesio-distal dimension was more in male children [4.68mm] compared to females children [4.52mm], but there was no statistical significance between the male children [4.7] and female children [4.6] in group-2.

The results of group-2 are similar to Arnet. A. Anderson among African American population in which male was [4.7mm] and female was [4.6mm] and among European American population in which male was [4.6mm] and female [4.6mm]. The results are also similar to Hung Huey Tsai [2001]^[16] among Taiwan population in which male was [4.7mm] and female was [4.6mm]. The results are also similar to Yoshikazu Kitagawa [2002]^[37] in Medieval sample was [4.7mm] and Edo sample [4.7mm]. The results were similar to Coenraad. F.A. Moorrees [1957]^[14] among North American population in which male children was [4.7mm] and female children was [4.6mm]

The bucco-lingual dimension of lower lateral was more in

group-2 [4.6mm] compared to group-1 [4.2mm] as depicted in table- 4. There was no statistical difference between the male children [4.2mm] and female children [4.2mm] in group -1 as well as male children [4.7mm] and female children [4.6mm] in group -2.

These findings are similar to Koora. k [2010] ^[4] among Chennai population 4.6mm] and Hyderabad population [4.5mm]. Among Chennai population the dimension for the male children was [4.7mm] and for the female children was [4.6mm]. Among Hyderabad population the dimension for the male children was [4.6mm] and for the female children was [4.5mm].

Dimensions of canines

1. Dimension of upper canine

There was no statistical difference between the mesio-distal dimension of upper canine in group 1 and group -2. There was also no statistical difference between the bucco-lingual dimension in group-1 and group-2. The bucco-lingual dimension of male children [6mm] was more than female children [5.7mm] in group-1, but there was no statistical difference between males children [6.1mm] and females children [6mm] in group-2 respectively.

The results of group-1 are similar to the findings of Koora.K [2010] ^[4] where the bucco-lingual dimension of male [6mm] was more than female [5.7mm] in Hyderabad population.

2. Dimension of lower canine

The mesio-distal dimension of lower canine of group 2 [5.9mm] was more than group 1 [5.6mm] for lower canines. There was no significant difference between males and females in the mesio-distal dimension of lower canine in group-2, but the mesio-distal dimension was more in male children [5.7mm] compared to female children [5.4mm] in group 1. The values of group-2 were similar to Koora.K [2010] ^[4] of Chennai population [5.9mm] and Hyderabad [5.8mm]. The results were also similar to Yoshikazu Kitagawa [2002] ^[37] similar to Edo [5.8mm] and modern Japanese [5.8mm]. The results were similar to Coenraad. F.A Moorrees [1957] ^[14] of North American population in white children ie [5.9mm].

The bucco-lingual dimension of lower canine was more in group-2 [5.7mm] compared to group-1 [5.4mm]. There was no statistical significance in the bucco-lingual dimension of lower canine between male children was [5.5] and female children was [5.3] in group-1 as depicted in table 8, as well as the male children was [5.8mm] and female children was [5.6mm] of group-2.

The results of group-1 are similar to the findings of Koora.K [2010] ^[21] among Hyderabad population [5.5mm]. The results also are similar to the findings of Hung Huey Tsai [[2001] ^[9] among Taiwan population [5.5mm] for both males and females. The results of were similar to the findings of Yoshikazu Kitagawa [2002] ^[13] in Medieval sample was [5.3mm], Edo sample [5.5mm], and Modern Japanese [5.49mm].

Conclusion

The importance of the tooth measurements and it's application in diagnosis and clinical dentistry has been well emphasized in the past. Some of more common types of the malocclusion are basically due to the discrepancy between the tooth material and the size of the dental arches. This discrepancy may be reflected clinically as crowding of the teeth, if the combination of excessive tooth material and a

short dental arch length exists. On the other hand, it may result in spacing and diastema between teeth if the arch length is more and the tooth material is less. In either case, it is a space problem, which is of great interest to general dentist, as well as to the pedodontist and orthodontist in diagnosis and treatment planning. The tooth size ratio also contribute great deal to balanced occlusion, facial harmony and esthetics.

Since very less studies on the measurements of the tooth size have been made in India further studies should be carried out all over India.

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