Tooth Crown Dimensions of Primary Molars in 3- to 7-year-old Children in Benin City, Nigeria.

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ABSTRACT

Objective: To determine the mesiodistal, buccolingual and clinical crown height dimensions of primary molars of children in Benin City, Nigeria

Methods: A cross sectional study conducted to determine the mesiodistal (MD), buccolingual (BL) and clinical crown height (CC-H) dimensions of first and second primary molars among patients attending the Paediatric Dentistry clinic, University of Benin Teaching Hospital, Benin City, Edo State. Mandibular and maxillary study models were made from impressions taken using alginate impression material. The tooth dimensions were measured from the study models with the use of an electronic digital caliper. Statistical analysis was done using SPSS version 21.0. Pearson correlation was used to ascertain the relationship between the tooth dimensions. Unpaired t-test was used to compare dimensions between male and female while paired t-test was used to compare molar dimensions in the quadrants and arches. The level of significance was set at <0.05.

Results: Fifty children whose age ranged from 3 to 7 years with a mean age of 5.74±1.12 years provided a total of four hundred measured primary molar teeth. The mandibular second molar had the largest mean mesiodistal width among males (10.17±0.78mm) and females (9.59±1.00mm). The mandibular first molar had the largest mean crown height among males (5.35±0.83mm) and females (5.16±0.80mm), the maxillary second molar had the largest mean buccolingual width among males (9.70±0.64mm) and females (9.58±0.48mm). There was a statistically significant difference in the mesiodistal width of primary mandibular second molars between males and females (p< 0.05).

Conclusion: The MD, BL dimension of the first molar and the CC-H of the second molar have the largest mean variability. There was sexual dimorphism in the primary mandibular second molar. The findings of this study will assist paediatric dentist in the South-South geopolitical zone to order for the appropriate primary molar dimensions of stainless steel crowns needed for full coverage restorations.

Key words: Primary molars, Mesiodistal, Buccolingual, Crown Height.

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INTRODUCTION

Tooth size dimension in human population is of great significance, not only their anthropological and forensic significance, but also in orthodontics as well as in full coverage restorative care. The size and form of tooth can be used to compare ancient and modern civilizations, because tooth size variations can be correlated with lifestyles, customs and variation in human race phylogenic scales in anthropology.[1] Forensic odontology concerns itself with intraoral structure especially tooth structures and their use in legal context for identification.[2] Teeth being the hardest intraoral structure are well protected and resist breakdown even at very high temperatures.

Forensic odontology techniques play a key role in human identification in incidences like; attacks, fire outbreaks, airplane mishaps, earthquakes and tsunamis etc.[2] From the Orthodontist and Paedodontist point of view, it is in the study of normal and abnormal development of occlusion and in the analysis of primary molars for full coverage restoration.[3]

The role of hereditary and environmental factors in tooth size dimension remains controversial .[4] It is currently accepted that socioeconomic, gestational and systemic conditions could modify tooth size.[5,6,7] Moreso, previous studies revealed that tooth size discrepancy do exist in different population and ethnic groups.[3,8,9]

In an attempt to maintain molars in primary dentition up to the eruption times of the permanent successors, full coverage restorative materials and techniques was introduced.[4] Rocky Mountain Company in 1947 introduced Stainless Steel Crown (SSC), which was made popular by W. P. Humphrey in 1950s.[5] Since then, SSCs have been increasingly used for various indications such as severely damaged molars, hypoplastic and hypomineralised molars, following pulp therapies, bruxism in children and as part of abutment in space maintaining appliances among others. Stainless steel crowns of different shapes, sizes and contours (festooned) have been introduced by different manufacturers; Unitek SSC, 3M Co, Rocky Mountain and Denvo Co.[10]

The selection of an appropriate SSC in terms of proximal fit as well as marginal adaptation from the supply pack of different sizes has remained a challenge for clinicians particularly paediatric dentists.[9] Such challenges would be minimized if the knowledge of the prevailing sizes of primary molars for this specific population for which the SSC is required is known. This will guide the paediatric dentist to order for the appropriate primary molar dimensions need in the geo-political zone.

In Nigeria, there are diverse ethnic groups and geopolitical zones with a few available studies[11-12] from the country revealing males to have a larger mean tooth dimension. Eigbobo et al[11] in study conducted among mixed ethnic groups in South-Western Nigeria reported that the mandibular primary second molar and maxillary primary second molar have the largest mean MD and BL dimensions respectively.

Data regarding tooth dimensions are available in literature[6,11-13]; however, literature search revealed no information on the sizes of primary molar in children from the South-South Geo-political zone of Nigeria. Therefore, the aim of the study was to obtain the mean mesiodistal, buccolingual and clinical crown (heights) sizes of primary molars among children 3- to 7-year-olds living in Benin City, Nigeria. Also, to determine sexual dimorphism and antimeric (right, left) variability and predict the variability in crown dimensions to aid the procurement of the appropriate size of SSC for full coverage restorations.

MATERIALS AND METHOD

The protocol for this study was reviewed and approval granted by the Ethics and Research Committee of the University of Benin Teaching Hospital, Benin City, Nigeria with protocol number ADM/E.22//A/VOL.V11/148275. Permission was obtained from the Head, Paediatric Unit, Department of Preventive Dentistry, University of Benin Teaching Hospital, Benin City, Nigeria. Written informed consent and assent were obtained from guardians of minors and from the participants, respectively, using the Nigerian National Health Research Ethics Code model.

Inclusion criteria included: children aged 3 to 7 years with fully erupted mandibular and maxillary first and second primary molars; those with sound interproximal and buccal/lingual walls with or without minimal occlusal pits and fissure incipient caries; those with no previous interproximal and buccal/lingual restoration; children whose parents were of Edo and Delta States origin in the South-South geo-political region of Nigeria. Children with gross carious lesions, hypo mineralization, hypoplasia and fracture and those with medical disability were excluded.

Fifty children aged 3 to 7 were recruited from among the children that visited the Paediatric dental clinic in the University of Benin Teaching Hospital. All children presented were examined with sterile mouth mirrors, dental explorers, face masks and examination gloves. Mandibular and maxillary impressions were made using alginate impression material and the study model fabricated in dental stone. Study models were inspected for voids, cracks and fractures. The study cast with irregularities were discarded while those without any form of irregularity were based with Plaster of Paris to aid stability and ensure easy measurement. The study models were also numbered for ease of identification.

Study procedure
A pretest measurement was done on five study models by the principal examiner (PUO) and one of the co-authors (OO). The study models were randomly selected and the mesiodistal (MD), buccolingual (BL) dimensions and the clinical crown heights (CC-H) of tooth number 54, 55, 64, 65, 74, 75, 84 and 85 were measured using a digital caliper. The inter-examiner reliability test indicated by K (Cohen's kappa) was 0.85 while the intra-examiner reliability was 0.90.

The mesiodistal, bucco-lingual and clinical crown heights of the first and second primary molars were measured using a digital Vernier caliper (3M brand TRESNA^{R}) with 0.1mm precision and recorded according to Moorrees et al.[15] The landmarks for the mesiodistal dimension was the distance between the mesial and distal contact points of each tooth (54, 55, 64, 65, 74, 75, 84 and 85). The buccolingual dimension measured was the maximum width between the buccal and lingual surfaces perpendicular to the mesiodistal size while the clinical crown height dimension spanned from the cervical margin to the occlusal cusp tip. Each landmark measurement was done twice and the average of both measurements for each tooth was recorded.

Data were analyzed using the Statistical Package for Social Sciences SPSS version 21.0 (IBM, Chicago). The mean and standard deviation were determined. Mann-Whitney U test was used for independent samples to compare the tooth size gender difference and dependent t-test (Wilcoxon rank test) for teeth inarch and quadrants. The statistical significance was set at a level of 5%.

RESULTS
Fifty children aged 3 to 7 years with a mean age of 5.74 $\pm$ 1.12 years provided a total of four hundred measured molar teeth. There were more males than females (56% vs 44% respectively). Fifty teeth each for tooth 54, 55, 64, 65, 74,75, 84, and 85 were measured, making a total of four hundred teeth used in this study.

The largest mean tooth dimension among males was the mesiodistal width of mandibular second molar (75, 85) measuring 10.13 $\pm$ 0.78 mm and the least was the clinical crown height of the maxillary second molar (55, 65) with 4.57 $\pm$ 0.91 mm in dimension.[Table 1]

The largest mean tooth dimension among females was the mean mesiodistal tooth dimension of the mandibular second molar (75, 85) measuring 9.64 $\pm$ 0.91mm and the least was the clinical crown height of the maxillary second molar (55, 65) with 4.59 $\pm$ 0.70 in dimension.[Table 1]

Generally, males had larger primary molar sizes compared to females in all the teeth measured except 54, 64 and 55, 65. The teeth with the largest mean mesiodistal width was the mandibular second molars [75, 85] in males with 10.13 $\pm$ 0.78mm in dimension compared to 9.64$\pm$ 0.91mm in females. The tooth with the largest mean buccolingual diameter was the maxillary second molar [55, 65] in males with 9.63 $\pm$ 0.68 mm compared to 9.54 $\pm$ 0.68mm in females while the largest clinical crown height was recorded in the mandibular first molars [74, 84] among males measuring 5.15 $\pm$ 0.77mm compared to 5.07 $\pm$ 0.71 in females. There was a statistically significant difference in the mesiodistal dimension of the mandibular second molars by gender (p= 0.004). However, no significant sexual dimorphism was observed in the dimensions of the other primary molars tooth (p-values >0.05). [Table I]

Figure1 shows the antimeric mean sizes of primary first molar with the maxillary MD (right and left) with the same dimension (7.8mm) but the maxillary BL of right slightly lower than the left (8.2mm vs 8.42mm). The mandibular left primary first molar had the highest CC-H (5.26mm) while it was same for the maxillary right and left (5.06mm respectively).

Figure 2 shows the antimeric mean sizes of primary second molars with the left mandibular CC-H slightly lower than the right mandibular CC-H (4.62 vs 4.8mm). The mandibular MD (right and left) is the same (9.9mm) but slightly higher than the maxillary right (9.45mm) and left (9.33mm).

Generally, the left mandibular primary first molar had greater BL (7.74 ± 0.75) and CC-H (5.26 ± 0.81) dimensions compared to the right (7.56 ± 0.65 vs 4.96 ± 0.64). However, the right MD width is larger compared to the left (8.03 ± 0.72 vs 7.98 ± 0.57).

The MD dimension of the mandibular right primary first molar is slightly larger than the right maxilla (8.03 ± 0.72 vs 7.81 ± 0.92). The BL and CC-H of the mandibular right primary first molar is slightly less than the right maxilla (7.56 ± 0.65 vs (8.20 ± 0.69) and (4.96 ± 0.64 vs 5.06 ± 0.75) respectively. Although there was slight variation in the dimensions of the molar teeth in both arches, and on the right and left, the difference was not statistically significant except the mean BL tooth dimension of the maxillary first primary molar and the mean CC-H of the mandibular first primary molar (p= 0.034; 0.019 respectively). [Table 2]

The co-efficient of variability obtained for each primary molar dimension measured showed that the MD dimension is the least variable (9.97%) of the three dimensions studied for first molar. More so, the B-L dimension is the least variable (7.32%) of the three dimensions studied on the second molar while for the CC-H, the first molar was least variable (14.49%). [Table 3]

The MD dimension of the first and second primary mandibular molars among males in this study is comparable to that obtained in Sao Paulo but slightly higher than other national or international studies (8.10 ± 0.65 and 10.13 ± 0.78 vs 7.94 ± 0.52 and 9.70 ± 0.46). The MD dimension of the first primary maxillary molars among females in this study is slightly higher than other national or international studies (8.02 ± 0.93 vs 7.14 ± 0.59 or 6.34 ± 0.51). [Table 4] More so, the BL of the first mandibular molar is slightly larger than that in a previous national study (7.69 ± 0.67 vs 6.90 ± 0.77), but that of the second mandibular molar is slightly lesser than a previous national study (7.60 ± 0.74 vs 8.89 ± 0.60). The CC-H of the first primary mandibular molar in this study is comparable to other previous national and international studies (5.15 ± 0.77). [Table 4]

Table 1: Mean dimensions of primary molars by gender

Mandibular Molars		**Gender**		**p value**
		Male Mean (SD)mm	**Female Mean (SD)mm**	
	74,84	8.10(0.65)	7.90(0.64)	0.141
Mesiodistal	75,85	10.13(0.78)	9.64(0.91)	0.004*
Buccolingual	74,84	7.69(0.67)	7.60(0.74)	0.494
	75.85	9.41(0.58)	9.37(0.82)	0.747
Crown Height	74,84	5.15(0.77)	5.07(0.71)	0.581
	75,85	4.73(0.65)	4.69(0.93)	0.763
Maxillary molars				
Mesiodistal	54,64	7.70(0.85)	8.02(0.93)	0.077
	55,65	9.42(0.85)	9.37(0.97)	0.772
Buccolingual	54,64	8.45(0.73)	8.16(0.79)	0.065
	55,65	9.63(0.68)	9.54(0.68)	0.519
Clinical Crown Height	54,64	5.14(0.77)	4.97(0.70)	0.242
	55,65	4.57(0.91)	4.59(0.70)	0.918

*p<0.05 is significant

Table 2: **Mean comparison of quadrant/arch (antimeric) variability of the primary molars**

Dimension	Mandibular molar teeth			Maxillary molar teeth		
	Right	Left	P-value	Right	Left	p-value
M-D	Mean (SD)mm	Mean (SD)mm		Mean (SD)mm	Mean (SD)mm	
1st Molar	8.03(0.72)	7.98(0.57)	0.513	7.81(0.92)	7.90(0.89)	0.599
2nd Molar	9.89(0.94)	9.90(0.82)	0.941	9.45(0.95)	9.33(0.86)	0.402
B-L						
1st Molar	7.56(0.65)	7.74(0.75)	0.131	8.20(0.69)	8.42(0.84)	0.034*
2nd Molar	9.27(0.80)	9.51(0.58)	0.091	9.52(0.77)	9.64(0.57)	0.327
CC-H						
1st Molar	4.96(0.64)	5.26(0.81)	0.019*	5.06(0.75)	5.06(0.73)	0.981
2nd Molar	4.62(0.78)	4.80(0.80)	0.179	4.69(0.94)	4.47(0.64)	0.168

*p<0.05 is significant

M-D [Mesiodistal] B-L [Buccolingual]. CC-H [Clinical crown height]

Table 3: Co-efficient of Variability (CV %)

Measurement	Tooth	CV (%)
M-D	1st Molar	9.97
M-D	2nd Molar	9.57
B-L	1st Molar	10.12
B-L	2nd Molar	7.32
CC-H	1st Molar	14.49
CC-H	2nd Molar	17.24

M-D [Mesiodistal] B-L [Buccolingual] CC-H [Clinical crown height]

Table 4: **Mean mesiodistal, buccolingual and clinical crown (height) dimensions of primary molars in various countries**

Continent Country/location Author	**Sex**	**MD**				**BL**				**CC-H**			
		Mb 1	Mb2	Mx 1	Mx 2	Mb 1	Mb2	Mx 1	Mx 2	Mb 1	Mb2	Mx 1	Mx 2
Africa Nigeria/Benin This Study	M	8.10±.65	10.13±.78	7.70±.85	9.42±.85	7.69±.67	7.60±.74	8.45±.73	9.63±.68	5.15±.77	4.73±.65	5.14±.77	4.57±.91
	F	7.90±.64	9.64±.91	8.02±.93	9.37±.97	7.60±.74	7.60±.74	8.16±.79	9.54±.68	5.07±.71	4.69±.93	4.97±.70	4.59±.70
Africa Nigeria/Lagos Eigbobo et al	M	7.94±.52	9.70±.46	7.40±.55	9.25±.53	6.90±.77	8.89±.60	7.96±.82	9.47±.80	5.20±.56	5.09±.42	4.85±.51	4.87±.46
	F	7.71±.47	9.80±.51	7.14±.59	9.12±.48	6.86±.59	8.72±.58	7.87±.77	9.33±.74	5.23±.44	5.03±.46	4.72±.39	4.70±.45
Asia India/S-India Eswara K et al	M	7.58±.47	9.54±.55	6.34±.47	8.63±.71	7.82±.58	9.13±.56	7.96±.82	9.47±.80	5.20±.56	5.09±.42	4.85±.51	4.87±.46
	F	7.39±.52	9.29±.65	6.34±.51	8.71±.55	7.47±.64	8.84±.43	7.87±.77	9.33±.74	5.23±.44	5.03±.46	4.72±.39	4.70±.45
S/ America USA/Wisconsin Harila et al. 003	M	8.87+.48	9.90±.49	7.09±.43	7.75±.44	9.65±.52	8.89±.49	-	-	-	-	-	-
	F	8.68±.52	9.97±.48	6.87±.48	7.62±.42	9.42±.48	8.71±.50	-	-	-	-	-	-
N/America Brazil/Sao Paulo, Anfe TEA et al.	M/F	8.09±.51	10.02±.45	6.99±.48	8.93±.57	7.05±.43	8.67±.45	8.66±.58	9.62±.48	6.00±.47	5.50±.47	5.22±.44	5.34±.46
Europe Spain/Madrid Barbería E et al	M	7.94±.52	9.96±.54	7.40±.55	9.25±.53	6.90±.77	8.89±.60	7.96±.82	9.47±.80	5.20±.56	5.09±.42	4.85±.51	4.87±.46
	F	7.71±.47	9.70±.46	7.14±.59	9.12±.48	6.86±.59	8.72±.58	7.87±.77	9.33±.74	5.23±.44	5.03±.46	4.72±.39	4.70±.45

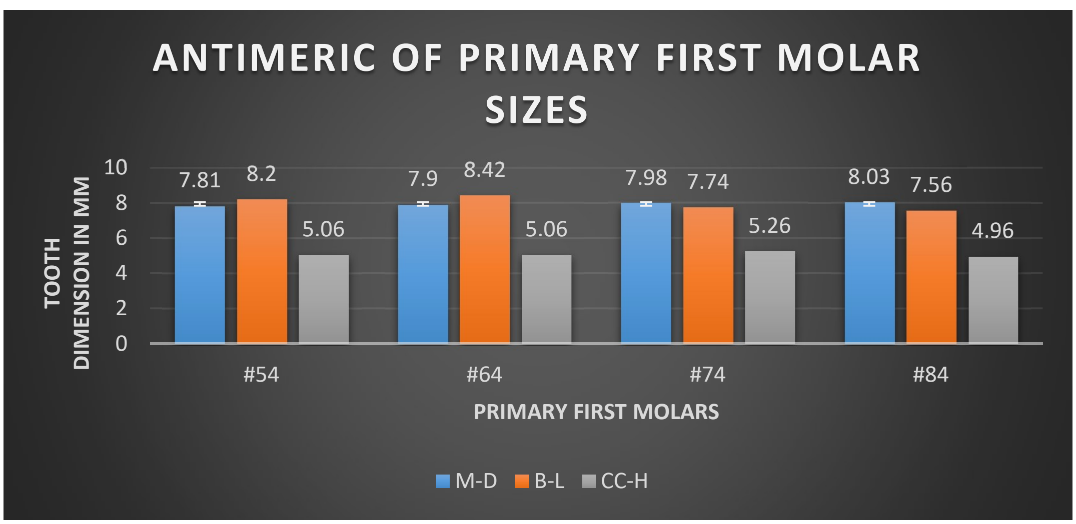

Figure1: **Antimeric mean sizes of primary first molars**

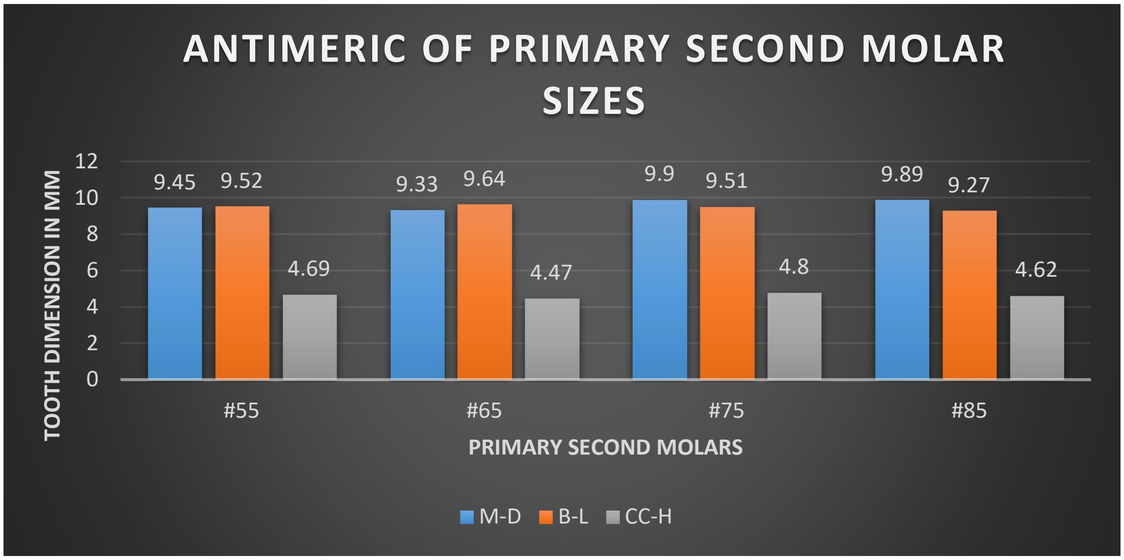

Figure 2: **Antimeric mean sizes of primary second molars**

DISCUSSION

The significance of human tooth size dimension in anthropological and forensic studies cannot be overemphasized. More so, data obtained from the measurement of tooth dimensions are very useful in full restoration of primary and permanent molars, as well as the understanding of the occlusal relationship of primary dentition.[16] Studies abound in literature but sparse regarding primary dentition in most populations including the Nigerian child. This study obtained the mean buccolingual, mesiodistal, and clinical crown (heights) dimensions of the primary molars in a selected group of children from South-South geo-political region living in Benin City, Nigeria.

Mesiodistal tooth dimension

There was an increase in the mesiodistal dimension from the primary first to second molars in both mandibular and maxillary arches and gender among the study population. This trend is similar to what was observed in previous studies.[3,6,10,17,18] Males have a slightly larger mean MD dimension in the primary mandibular first and second molar in this study, similar to some previous studies[3,6] but differs from other studies that the females had a slightly higher dimension, especially the second molar.[11,17]

In this study, while the females had a slightly higher MD dimension on the mandibular first molar, the reverse was the case on the second molar, this is at variance with previous studies.[11,17] The gender differences observed in this study was the mesiodistal dimension of the mandibular second molar which showed a greater dimorphism. This finding differs from a previous Nigerian study,[11] which reported that the mandibular first molar had the greatest dimorphism but partly agrees with Eswara et al[3] and Barbería et al,[6] where both mandibular first and second were reported with greater gender differences. The different measuring instruments as well as genetic, environmental and racial differences could have been responsible for the variations. Though Tejeroet al[19] reported a significant difference in antimeric (right and left) teeth comparison with reference to maxillary second primary molars. In this study, the MD width of the second molar was least variable but did not yield any statistically significant difference in antimeric measurements, this finding is similar to some previous studies.[3,6]

Buccolingual dimension

There was an increase in the buccolingual dimension measured at the maximal width between the buccal and lingual surfaces from primary first to second molars in both arches and gender among the study population. This is similar to findings in previous studies[3,6, 11,18,] but differs from study by Harila et al[17] who reported a decrease. The mean BL dimension observed in this study is slightly larger than a previous Nigerian study.[11] Males had slightly larger mean BL dimension on all primary molars as seen in previous studies[3,6, 11,17-18] There was no statistically significance gender differences observed in this study as none showed any greater dimorphism. However, this is contrary to findings reported by Barbería et al, [6] where maxillary second molar had greater dimorphism.

In this study, the BL width of the second molars had the least coefficient of variability while the maxillary first molar yielded statistically significant difference in terms of antimeric measurements which is contrary to previous studies.[3,6] The role of genetics, racial and environmental differences cannot be ruled out as responsible for these variations.

Clinical crown height

There was a decrease in the mean clinical crown height (measured from the cervical margin to the occlusal cusp tip) from primary first to second molars in both arches and gender among the study population. This finding is similar only on the mandibular molars but differ in the maxillary molars in previous studies.[6,11,17-18] The average CC-H obtained in this study is similar to previous studies[6,11]as regards the mandibular molars but differ on the maxillary molars. The reason for this difference could be because of the larger age span of the participants in this study.

There is likely to be variation in the consistency of the CC-H reference landmarks with increasing age, i.e. cervical margin and cusp tips, may be in doubt. In addition, there could be variations in the cervical margins due to its soft tissue nature and the cusp tips due to occlusal attrition. The variations could account for the non-recording of clinical-crown heights in some previous studies.[17,20]No statistically significant gender differences was observed in this study as none showed any greater dimorphism.

In this study, the CC-H of the second molars had the most coefficient of variability while the mandibular first molar yielded statistically significant difference in antimeric measurements; this finding is contrary to a previous study.[3]

CONCLUSION

The MD, BL dimension of the first molar and the CC-H of the second molar have the largest mean variability. There was sexual dimorphism in the primary mandibular second molar. The findings of this study will assist paediatric dentist in the South-South geopolitical zone to order for the appropriate primary molar dimensions of stainless steel crowns needed for full coverage restorations.

Conflict of Interest
None Declared

REFERENCES

1. Hinton RJ, Smith MO, Smith FH. Tooth size changes in prehistoric Tennessee Indians. Hum Biol 1980; 52:229-245

2. Krishan K, Kanchan T, Garg AK. Dental evidence in forensic identification – an overview, methodology and present status. Open Dent J 2015; 9: 250-256

3. Eswara K, Avula JS, Mallela GMK, Enuganti S, Margana JS, Kakarla P. Deciduous molar sizes and sexual dimorphism: South Indian study. J Pediatr Dent 2014; 2: 13-19

4. Wong FS, Day SJ. An Investigation of factors influencing the longevity of restorations in primary molars. J Int Assoc Dent Child 1990; 20:11-16

5. Seale NS. The use of stainless steel crowns. J Pediatr Dent 2002; 24:501-505

6. Barbería E, Suárez MC, Villalón G, Maroto M, García-Godoy F. Standards for mesiodistal and buccolingual crown size and height of primary molars in a sample of Spanish Children. Eur J Paediatr Dent 2009; 10:169-175

7. Fearne JM, Brook AH. Small primary tooth-crown size in low birthweight children. Early Hum Dev 1993; 33:81-90

8. Togoo RA, Alqahtani AS, Alshahrani I, Zakinulla M, Alhotellah KA, Mujam OH. Comparison of mesiodistal tooth width in individuals from three ethnic groups in Southern Saudi Arabia. Niger J Clin Pract 2019; 22:553-557

9. Afshar H, Sabeti AK, Sharabi M. Comparison of primary molar crown dimensions with stainless steel crowns in a sample of Iranian children. J Dent Clin Prospects 2015; 9:86-91

10. Sajjanshetty S, Patil PS, Hugar D, Rajkumar K. Pediatric preformed metal crowns - An Update. J Dent Appl Sci. 2013; 2:29-32

11. Eigbobo J, Sote E, Oredugba F. Tooth crown dimensions of primary dentition in the Nigerian population. Acta Stomatol Croat 2010; 44:269-277

12. Yemitan AT, DaCosta OO, Sanu OO, Isiekwe MC. Biometrics of the primary dentition in a Nigerian sample. Nig Dent J 2009; 17: 49-51

13. Lysell L, Myrberg N. Mesiodistal tooth size in the deciduous and permanent dentitions. Eur J Orthod 1982; 4:113-122

14. Anderson AA. Dentition and occlusion development in African American children: Mesiodistal crown diameters and tooth-size ratios of primary teeth. Pediatr Dent 2005; 27:121-128

15. Moorrees CFA, Thomsen SO, Jensen E, Yen PKJ. Mesiodistal crown diameters of the deciduous and permanent teeth in individuals. J Dent Res 1957; 36:39-47

16. Sai HH. Morphological characteristics of the deciduous teeth. J Clin Pediatr Dent 2001; 25:95-101

17. Harila V, Heikkinen T, Alvesalo L. Deciduous tooth crown size in prematurely born children. Early Hum Dev 2003; 75:9-20

18. Anfe TEA, Arakaki Y, Nakamura DM, Vieira GF. Mesiodistal and buccolingual crown size of deciduous teeth from a tooth bank in Brazil. Braz Dent Sci 2012; 15:74-78

19. Tejero A, Plasencia E, Laniza A. Biometric study the primary dentition. Rev Esp Chur 1991; 21:167-179

20. Warren JJ, Bishara SE, Yonezu T. Tooth size-arch length relationships in the deciduous dentition: A comparison between contemporary and historical samples. Am J Orthod Dentofac Orthop 2003; 123:614-619