

Joycelyn Eigbobo¹, Elizabeth Sote², Folakemi Oredugba²

Dimenzije zubnih kruna u mliječnoj denticiji kod djece u Nigeriji

Tooth Crown Dimensions of Primary Dentition in the Nigerian Population

¹ Zavod za dječju stomatologiju Medicinskog fakulteta Sveučilišta Port Harcourt, Lagos, Nigerija
College of Health Sciences, University of Port Harcourt, Nigeria

² Zavod za dječju stomatologiju Medicinskog fakulteta Sveučilišta u Lagosu, Nigerija
College of Medicine, University of Lagos, Department of Child Dental Health, Lagos, Nigeria

Sažetak

Svrha: Željelo se dobiti odontometrijske podatke u trima dimenzijama – meziodistalnoj i bukolingvalnoj širini, te visini kliničke krune u mliječnoj denticiji kod nigerijske djece. **Materijali i metode:** Uzorak se sastojao od 400 zdrave djece u dobi od tri do pet godina kojoj su niknuli svi mliječni zubi. Nasumce su bila odabrana iz šest javnih vrtića. Nakon toga su od odabranog uzorka od alginatnih otisaka izrađeni gipsani modeli. Pomičnom elektroničkom mjerkom obavljena su i mjerenja meziodistalne (MD) i vestibularne (VO) širine te vrijednosti visine kliničke krune (VKK). Deskriptivna statistika dobivena je unosom vrijednosti u program SPSS - verzija 13. **Rezultati:** Izmjereno je ukupno osam tisuća zuba. Aritmetička sredina vrijednosti MD-a i VO-a povećavala se progresivno od bočnih sjekutića do drugoga mliječnog kutnjaka u maksilarnom luku, a kod mandibule rasla je od središnjeg sjekutića do drugoga mliječnog kutnjaka. Najveća aritmetička sredina širine MD-a od 10,20mm+0,56 pronađena je na drugom mandibularnom kutnjaku, a drugi maksilarni kutnjak imao je najveću aritmetičku srednju vrijednost BL-a 9,74mm+0,58. Kod mandibularnog očnjaka zabilježena je najveća vrijednost VKK-a – iznosila je od 5,83mm+0,61. Dječaci su kod većine zuba imali veću aritmetičku sredinu. Ustanovljena je statistički značajna razlika među visinama zuba obaju spolova ($p < 0,05$) te varijanca unutar njihovih vrsta. **Zaključak:** Može se reći da djeca u Nigeriji imaju veće mliječne zube negoli bijelci te Arapi (Jordanci) i Kinezi (Tajvanci), a istodobno su manji od zuba australskih Aboridina. Zabilježena je i sličnost u dimenzijama s djecom u Indiji.

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Dr. Joycelyn Eigbobo
College of Health Sciences,
University Of Port Harcourt
Department of Child Dental Health,
500001 Port Harcourt, Nigeria
odegwabobo@yahoo.com

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Uvod

Već je prije istaknuto koliko je važno primijeniti mjerenje veličine zuba u dijagnozi i kliničkoj dentalnoj medicini (1-4). Naime, veličina zuba jedan je od čimbenika koji utječe na razvoj okluzije, a to se može odrediti iz njihovih dimenzija (meziodistalna i vestibularna širina te klinička visina krune) (1, 5-7). Dimenzije zuba definiraju njegove karakteristike, određuju prostorni raspored, zatim dužinu, širinu, visinu ili veličinu te oblik. Morfologija i veličina može se promatrati tijekom djetinjstva (mliječna denticija) ili adolescencije (stadij trajne denticije), za razliku od skeletalne morfologije koja se temelji na završenom rastu kod odraslih kada se isključiti čimbenik rasta. To je moguće jer se zubna kruna potpuno oblikuje prije nicanja u usnoj šupljini (1).

Kao i mnoge druge značajke i veličina zuba razlikuje se kod muškaraca i žena, a te su razlike ponekad dosta velike. Zubne krune spolno su dimorfične, a da bi postigle razliku u veličini ne ovise o adolescentskoj fazi i spolnim hormonima (8). U mnogim je studijama istaknuto da u sklopu ne-

Introduction

The importance of tooth measurement and its application in diagnosis and clinical dentistry has been well emphasized in the past (1-4). The size of teeth is one of the factors affecting the development of occlusion and this is determined from the dimensions (the mesiodistal, buccolingual and clinical crown heights) of the tooth (1,5-7). Tooth dimensions define the characteristics of the tooth, a measure of spatial extent; the length, the width and the height or size and shape. The morphology and sizes of teeth can be studied during childhood (primary dentition stage) or adolescence (permanent dentition stage) unlike studies of skeletal morphology which are based on fully grown adults to eliminate the factor of growth. This is because the tooth crown is fully formed before its eruption into the oral cavity (1).

As in many other human attributes, teeth vary in size between males and females, these differences are sometimes significant. Tooth crowns are sexually dimorphic and are not dependent on the steroid mediated adolescent phase of

ke populacije kod muškaraca postoji tendencija većih mjera u dimenzijama zubnih kruna mliječne i trajne denticije (4, 7, 9-13). Mora se reći da su u mliječnoj denticiji razlike manje negoli u trajnoj (8, 14). Za razliku od istraživanja trajne denticije Garna i njegovih suradnika (15), a oni su zabilježili spolnu razliku od četiri posto za kombiniranu meziodistalnu dimenziju, Harris i Lease (8) dobili su razliku do dva posto među svim vrstama zuba kada su diljem svijeta istraživali i mjerili meziodistalne širine zubne kruna u mliječnoj denticiji.

Dok se većina autora usredotočila na meziodistalnu ili vestibularnu širinu ili na obje, klinička visina krune nije bila dio tih istraživanja. Dosadašnja literatura o dimenzijama zuba kod nigerijske populacije ograničena je na trajnu denticiju te na poneki izvještaj o veličini mliječnih zuba (6, 11, 16-18). U ovoj analizi raščlanit ćemo obavljena odontometrijska mjerenja u trima dimenzijama: meziodistalnoj i vestibularnoj širini te visini kliničke krune mliječne denticije. Paralelno ćemo istraživati dječake i djevojčice, a dobiveni podaci usporedit će se s izvještajima o ostalim rasama.

Materijal i metode

Istraživanje je odobrilo Etičko povjerenstvo Sveučilišne bolnice u Lagosu. Dobivena je i suglasnost Državnoga odbora za obrazovanje te roditelja. Nasumce je bilo odabrano šest vrtića s popisa od njih 63. Iz njih je tehnikom slučajnog odabira izdvojeno četiri stotine djece u dobi od tri do pet godina.

Kod svih je isti ispitivač obavio temeljit pregled u aseptičkim uvjetima, koristeći se jednokratnim rukavicama, maskom za lice, stomatološkim zrcalom, sondom te špatulama za jezik, dok je pacijent udobno i uspravno sjedio u stolcu pod prirodnim svjetlom u svojem vrtiću.

Ispitanik je uključen u istraživanje jedino ako su mu potpuno niknuli svi mliječni zubi. Za svu izabranu djecu pristanak su potpisali roditelji ili skrbnici.

Kriteriji za isključivanje bili su:

1. očit gubitak zubne strukture zbog karijesa, frakture, hipoplazije, erozije ili atricije te zubi s abnormalnostima u obliku ili broju, ili ako su bili obavljene restaurativni zahvati mezijalno ili distalno;
2. djeca s gingivitisom, gingivnom recesijom i zubnim kalcem (pregledana su i uključena samo djeca sa zdravom gingivom);
3. medicinski invaliditet.

Za otiske maksilarnih i mandibularnih zubnih lukova koristio se alginatni materijal (A 3KROM® Vada Dental Products, SAD) te jednokratna odgovarajuće velika sterilna žlica. Kako bi se osigurali dezinfekcija i dimenzijska stabilnost te spriječile netočnosti, otisci su dezinficirani u otopini natrijeva klorida (NaOCL) te zatim kratko pokriveni vlažnom stomatološkom gazom ili salvetom dok su se uzimali otisci i izlivali gipsani modeli (19, 20). U razdoblju od 30 minuta

growth to achieve the size difference (8). Studies have shown that within a population the dimensions of tooth crowns of the primary and permanent dentitions tend to be larger in males (4,7,9-13). However, gender differences in mesiodistal tooth crown dimensions were reportedly less pronounced in primary dentition than in permanent dentition (8,14). Unlike in the study of the permanent dentition by Garn et al (15) where gender difference was reported to be 4% for the combined mesiodistal size, Harris and Lease (8) reported 2% difference across all tooth types in a world wide study of mesiodistal tooth crown dimensions of primary dentition.

While most of the authors have concentrated on either mesiodistal or buccolingual dimension or both, the clinical crown height was not part of most of the previous studies. Existing literature on tooth crown dimensions in the Nigerian population are limited to the permanent dentition. There appeared to be sparse report on tooth dimensions of primary dentition (6,11,16-18). This study will provide odontometric information in three dimensions; mesiodistal, buccolingual and clinical crown height, in the primary dentition of Nigerians. A comparative assessment of mesiodistal, buccolingual and clinical crown height in males and females will be carried out. This will provide data for comparison with the reported observations among other races.

Materials and Methods

The study protocol was approved by the Ethics and Research Committee (ERC) of the Lagos University Teaching Hospital, Lagos. Written consent was obtained from the State Universal Basic Education Board (SUBEB) and the parents. Six nursery schools were selected from the list of 63 nursery schools obtained from the Local Government Education Authority by simple ballot. Four hundred children aged 3-5 years were selected from these schools by a random sampling technique.

A comprehensive oral examination was carried out under aseptic condition by a single examiner using disposable gloves, face masks, dental mirror, dental explorer and tongue depressors with the patient comfortably seated on an upright chair under natural light in their schools.

A subject was only included if he/she is a Nigerian and has presence of fully erupted primary dentition. All subjects included in the study had signed consent forms by parents or guardian.

Exclusion criteria:

1. Obvious loss of tooth substance as a result of caries, fracture, hypoplasia, erosion and attrition. A tooth with any abnormality in form or shape was excluded. The presence of mesial or distal restorations of teeth.
2. Children with gingivitis, gingival recession and dental calculus were also excluded, only children with healthy gingiva were examined.
3. Presence of medical disability.

Alginate impression material (A 3KROM® Vada Dental Products, USA) was used to take the impression of the maxillary and mandibular arches with the appropriate sized sterile disposable impression trays to include all teeth present.

modeli otisaka pažljivo su bili izliveni u gipsu (Begodur ISO 56010). Pritom se jako pazilo kako bi se izbjegli mjehurići zraka ili pogreške u modelu.

Mjerenja

Sva mjerenja zuba obavljena su pod prirodnim svjetlom, a upotrebljena je elektronička digitalna pomična mjerka (Neiko® tools, SAD). Na dan se izmjerilo samo deset parova gipsanih modela kako bi se spriječio vizualni zamor (21). Pritom su se bilježile meziodistalna i vestibularna oralna širina te visina kliničke krune kod mliječnih sjekutića, očajaka i molara u oba zubna luka. Meziodistalna dimenzija dobivena je mjerenjem udaljenosti između mezijalne i distalne kontaktne točke zuba na crti usporednoj s okluzalnom ravninom. Vestibularna dimenzija dobivena je mjerenjem najveće udaljenosti oralne i vestibularne površine zuba okomito na izmjereni meziodistalnu dimenziju, a klinička visina krune mjerila se kao udaljenost između vrška najviše kvržice i gingivnoga ruba (1, 22).

Kako bi se minimizirale nedosljednosti, svi su zubi izmjereni dva puta. Ako je razlika bila 0,2 milimetra ili manje, uzet je prosjek dvaju mjerenja. Ako je odstupanje bilo veće od 0,2 milimetra, mjerilo se i treći put, te je kao konačan odabran prosjek svih triju mjerenja (6). Izmjereni su zubi s objiju strana zubnog luka, zatim su vrijednosti lijeve i desne strane zbrojene te je za konačnu analizu uzet njihov prosjek (14).

Kako bi se testirala pouzdanost ispitivača, dva tjedna nakon prvog mjerenja odabrano je nasumce 40 parova modela te je isti ispitivač ponovno izmjerio sve parametre – meziodistalnu i vestibularnu širinu te visinu kliničke krune (18, 23). Korelacija u skupni koristila se za određivanje konzistencije i slaganje vrijednosti te za testiranje ponavljanja, a pokazala je statistički značajnu konzistenciju slaganja vrijednosti unutar istih slučajeva te je za sve mjerene parametre iznosila $P < 0,01$.

Statistička analiza

Analiza podataka obavljena je statističkim paketom za društvene znanosti Sciences (SPSS® for Windows 2004, version 13.0, SPSS inc., Chicago, III., SAD). Određivali su se aritmetička sredina, raspon, standardna devijacija i koeficijent varijance dimenzija zubne krune. Procjena spolne razlike za dimenzije zuba prikazana je u postotcima (14). Spolne razlike za ispitane varijable procijenjene su studentskim *t*-testom za nesparene uzorke. Opažene razlike smatrale su se statistički značajnima kada je *p*-vrijednost bila manja od 0,05 .

To ensure disinfection, dimensional stability and prevent inaccuracies, the impressions were disinfected in sodium hypochlorite and then covered with a damp dental napkin/gauze, during the short interval between impression taking and pouring of dental stone (19,20). The models of the impressions were carefully prepared within 30 minutes using dental stone (Begodur ISO 56010) with special care taken to avoid bubbles or defective models.

Measurements

All the tooth measurements were carried out under natural light using an electronic digital caliper (Neiko® tools, USA). Only ten pairs of study models were measured each day to prevent visual fatigue (21). Parameters measured include the mesiodistal, buccolingual and clinical crown height dimensions for the primary incisors, canines, and molars for both arches. The mesiodistal dimensions were obtained by measuring the maximum distance between the mesial and distal contact points of the tooth on a line parallel to the occlusal plane. The buccolingual dimensions were obtained by measuring the greatest distance between the lingual and buccal surface of the tooth at a right angle to the mesiodistal measurement while the clinical crown heights were obtained by measuring the distance between the tips of the highest cusp to the gingival margin (1,22).

To minimize inconsistencies, the teeth were measured twice. When the difference between the two readings varied by 0.2mm or less, the mean of the two measurements was taken. Where the two measurements differed by more than 0.2mm, the teeth were re-measured and the mean of the three measurements were taken (6). Measurements were obtained on both sides of the dental arch; values averaged from right and left measurements were used in the final analysis (14). In order to test for intra examiner reliability, forty pairs of models were randomly selected, and the parameters mesiodistal, buccolingual and clinical crown height of all teeth were measured again by the same investigator two weeks after the first measurements to assess the examiner's reliability for the variables (18,23). Intraclass correlation coefficient was used to assess the consistency or agreement of values within cases for repeatability, and it showed a statistically significant consistency or agreement of values within cases for all the parameters estimated ($P < 0.01$).

Data analysis

Data collected were analyzed using the Statistical Package for Social Sciences (SPSS® for Windows 2004, version 13.0, SPSS inc., Chicago, III., U.S.A. The mean, range, standard deviation, coefficient of variance of the tooth crown dimensions were determined. The estimation of gender differences in tooth dimensions were expressed as percentages (14). Gender differences of the tested variables were evaluated using unpaired student *t* test. An observed difference was considered statistically significant when *p*-value was less than 0.05.

Rezultati

Dob i spol

Bili su analizirani zubi 205 (51,25%) dječaka i 195 (48,75%) djevojčica s aritmetičkom sredinom dobi od 4,27 godina $\pm 0,69$, te pogreškom standardne devijacije godina (SEM-om) od 0,03; 4,41 godina $\pm 0,76$ godina i SEM-om godina od 0,03 kod dječaka i 4,12 godina $\pm 0,57$ te SEM-om godina od 0,04 kod djevojčica.

Ukupan broj izmjerenih zuba bio je osam tisuća – tisuću i 600 maksilarnih i mandibularnih središnjih sjekutića, tisuću i 600 maksilarnih i mandibularnih bočnih sjekutića, tisuću i 600 maksilarnih i mandibularnih očnjaka, tisuću i 600 maksilarnih i mandibularnih prvih mliječnih kutnjaka te tisuću i 600 maksilarnih i mandibularnih drugih mliječnih kutnjaka.

Aritmetičke sredine dimenzija zubne kruna

Meziodistalne i vestibularne dimenzije kruna kod maksilarnih zuba povećavale su se progresivno od bočnog sjekutića do drugog mliječnog molara, a u mandibuli od središnjih sjekutića do prvoga mliječnog kutnjaka (Tablica 1.). Najveća vrijednost aritmetičke sredine bila je izmjerena širina MD-a drugog mandibularnog mliječnog kutnjaka od 10,20mm $\pm 0,56$, a najmanji MD bio je 4,28mm $\pm 0,31$ kod središnjih mandibularnih sjekutića. Kod širine VO-a najveću vrijednost od 9,74mm $\pm 0,58$ imao je drugi maksilarni kutnjak, a najmanja vrijednost od 3,95mm $\pm 0,40$ pronađena je kod središnjih maksilarnih sjekutića. Maksilarni i mandibularni očnjaci imali su najveće kliničke visine kruna od 5,47mm $\pm 0,63$ te 5,83mm $\pm 0,61$, a najmanju kliničku visinu kruna imali su drugi maksilarni (4,14mm $\pm 0,52$) i mandibularni (3,75mm $\pm 0,55$) kutnjaci. (Tablica 1.)

Spolne razlike

Deskriptivna statistika na meziodistalnoj i vestibularnoj širini te visini kliničke kruna zuba kod dječaka i djevojčica prikazana je u tablicama od 2 do 4. Dječaci su imali pretežno veće aritmetičke sredine dimenzija zuba u svim parametrima od djevojčica. Iznimke su bile meziodistalna širina bočnog maksilarnog inciziva, vestibularna širina mandibularnih očnjaka te visina kliničke kruna kod bočnih maksilarnih sjeku-

Results

Age and gender

There were 205 (51.25%) males and 195 (48.75%) females with the mean age of 4.27 years ± 0.69 and Standard Error of Mean (SEM) Age 0.03; 4.41 years ± 0.76 years and SEM Age of 0.03 in males and 4.12 years ± 0.57 and SEM Age 0.04 in females.

The total number of teeth measured were 8000 teeth; 1600 maxillary and mandibular central incisors, 1600 maxillary and mandibular lateral incisors, 1600 maxillary and mandibular canines, 1600 maxillary and mandibular 1st molars and 1600 maxillary and mandibular 2nd molars.

The Mean Tooth Crown Dimensions

The Mesiodistal (MD) and Buccolingual (BL) tooth crown dimensions increased progressively from the lateral incisors to the second primary molars in the maxillary arch, while on the mandibular arch the dimensions increased from the central incisors to the second primary molars (Table 1). The largest mean tooth dimension was the MD tooth dimension of the mandibular second molar 10.20mm ± 0.56 , while the least MD tooth dimension was found in the mandibular central incisor 4.28mm ± 0.31 . For the BL dimension, the maxillary second molar had the largest value of 9.74mm ± 0.58 , while the least was the maxillary central incisors 3.95mm ± 0.40 . The maxillary and mandibular canines had the largest clinical crown height with 5.47mm ± 0.63 and 5.83mm ± 0.61 , while the least dimensions were found in the second molars 4.14mm ± 0.52 and 3.75mm ± 0.55 in the maxillary and mandibular arches respectively. (Table 1)

Gender Differences

The descriptive statistics on the mesiodistal, buccolingual and clinical crown height tooth dimensions of male and female primary dentition are shown in Tables 2-4. The males had predominantly larger mean tooth dimensions in all parameters than the females in most tooth types. The exceptions were the MD dimensions of the maxillary lateral incisors, BL dimensions of the mandibular canines and the

Tablica 1. U istraživanju dobivena aritmetička sredina standardne devijacije (SD-a) dimenzija zuba u mliječnoj denticiji kod nigerijske djece
Table 1 The Mean Tooth Dimensions and standard deviations (SD) of the Primary Dentition of Nigerian Children in the study.

Zub • Tooth Type	Meziodistalna širina • Mesiodistal dimension (mm)	Bukolingvalna širina • Buccolingual Dimension (mm)	Visina kliničke kruna • Clinical Crown Height (mm)
	Mean (SD)	Mean (SD)	Mean (SD)
Maksila • Maxilla			
Središnji sjekutić • Central incisors	6.93 (0.52)	5.18 (0.52)	5.36 (0.74)
Bočni sjekutić • Lateral incisors	5.59 (0.45)	4.82 (0.45)	4.91 (0.60)
Očnjak • Canine	6.76 (0.43)	5.95 (0.50)	5.47 (0.63)
Prvi molar • 1 st molar	7.63 (0.50)	8.55 (0.51)	4.58 (0.49)
Drugi molar • 2 nd molar	9.03 (0.68)	9.74 (0.58)	4.14 (0.52)
Mandibula •Mandible			
Središnji sjekutić • Central incisors	4.28 (0.31)	3.95 (0.40)	4.79 (0.48)
Bočni sjekutić • Lateral incisors	4.79 (0.48)	4.30 (0.41)	5.17 (0.57)
Očnjak • Canine	5.97 (0.44)	5.42 (0.45)	5.83 (0.61)
Prvi molar • 1 st molar	8.30 (0.52)	7.20 (0.53)	4.74 (0.68)
Drugi molar • 2 nd molar	10.20 (0.56)	9.05 (0.60)	3.75 (0.55)

Tablica 2. Deskriptivna statistika meziodistalne širine krune u mliječnoj denticiji kod nigerijske djece prema spolu
Table 2 Descriptive statistics of the *Mesiodistal tooth crown dimensions* of the primary dentition of Nigerian Children according to gender.

Zub • Tooth Type	Dječaci (205) • Males (n=205)		Djevojčice (195) • Females (n=195)		Srednja razlika • Mean Difference %	t-test p vrijednost • p Value
	Mean (SD)	CV	Mean (SD)	CV		
Maksila • Maxilla						
Središnji sjekutić • Central incisors	6.99 (0.43)	6.14	6.86 (0.60)	8.70	1.89	0.01*
Bočni sjekutić • Lateral incisors	5.61 (0.41)	7.23	5.67 (0.49)	8.22	-1.06	0.33
Očnjak • Canine	6.80 (0.40)	5.81	6.73 (0.47)	6.99	1.04	0.19
Prvi molar • 1 st molar	7.78 (0.48)	6.23	7.48 (0.47)	6.31	4.01	0.00*
Drugi molar • 2 nd molar	9.18 (0.73)	7.93	8.87 (0.57)	6.45	3.40	0.00*
Mandibula •Mandible						
Središnji sjekutić • Central incisors	4.35 (0.27)	6.21	4.21 (0.34)	8.06	3.33	0.00*
Bočni sjekutić • Lateral incisors	4.81 (0.46)	9.58	4.76 (0.49)	10.31	1.05	0.29
Očnjak • Canine	6.03 (0.49)	8.10	5.91 (0.38)	6.45	2.40	0.01*
Prvi molar • 1 st molar	8.33 (0.45)	5.14	8.28 (0.58)	7.06	0.60	0.34
Drugi molar • 2 nd molar	10.28 (0.49)	4.80	10.13 (0.62)	6.14	1.48	0.01*

*P vrijednost <0,05 je značajna; SD= standardna devijacija; CV=koeficijent varijance •

*P value <0.05 is significant, SD= standard deviation, CV=coefficient of variation

Tablica 3. Deskriptivna statistika bukolingvalne širine krune u mliječnoj denticiji kod nigerijske djece prema spolu.
Table 3 Descriptive statistics of the *Buccolingual tooth crown dimensions* of the primary dentition of Nigerian Children according to gender.

Zub • Tooth Type	Dječaci (205) • Males (n=205)		Djevojčice (195) • Females (n=195)		Srednja razlika • Mean Difference %	t-test p vrijednost • p Value
	Mean (SD)	CV	Mean (SD)	CV		
Maksila • Maxilla						
Središnji sjekutić • Central incisors	5.21 (0.62)	11.80	5.14 (0.38)	7.34	1.36	0.17
Bočni sjekutić • Lateral incisors	4.86 (0.45)	9.34	4.78 (0.44)	9.24	1.67	0.09
Očnjak • Canine	6.02 (0.51)	8.46	5.88 (0.49)	8.28	2.38	0.00*
Prvi molar • 1 st molar	8.63 (0.47)	5.42	8.46 (0.53)	6.27	2.01	0.00*
Drugi molar • 2 nd molar	9.81 (0.57)	5.77	9.67 (0.59)	6.05	1.45	0.02*
Mandibula •Mandible						
Središnji sjekutić • Central incisors	3.99 (0.41)	10.24	3.92 (0.38)	9.69	1.79	0.09
Bočni sjekutić • Lateral incisors	4.30 (0.46)	10.61	4.30 (0.36)	8.29	0.00	0.94
Očnjak • Canine	5.41 (0.45)	8.26	5.43 (0.44)	8.19	-0.37	0.56
Prvi molar • 1 st molar	7.33 (0.58)	7.88	7.06 (0.43)	6.09	3.82	0.00*
Drugi molar • 2 nd molar	9.13 (0.53)	5.75	8.96 (0.66)	7.50	0.78	0.01*

*P vrijednost <0,05 je značajna; SD= standardna devijacija; CV=koeficijent varijance •

*P value <0.05 is significant, SD= standard deviation, CV=coefficient of variation

Tablica 4. Deskriptivna statistika kliničke visine krune u mliječnoj denticiji kod nigerijske djece prema spolu
Table 4 Descriptive statistics of the *Clinical crown Heights* of the primary dentition of Nigerian Children according to gender.

Zub • Tooth Type	Dječaci (205) • Males (n=205)		Djevojčice (195) • Females (n=195)		Srednja razlika • Mean Difference %	t-test p vrijednost • p Value
	Mean (SD)	CV	Mean (SD)	CV		
Maksila • Maxilla						
Središnji sjekutić • Central incisors	5.43 (0.75)	13.86	5.28 (0.72)	13.54	-2.84	0.05
Bočni sjekutić • Lateral incisors	4.86 (0.59)	12.06	4.96 (0.61)	12.31	-2.02	0.09
Očnjak • Canine	5.45 (0.60)	10.97	5.51 (0.67)	12.13	-1.09	0.34
Prvi molar • 1 st molar	4.65 (0.50)	10.80	4.50 (0.47)	10.42	3.33	0.00*
Drugi molar • 2 nd molar	4.23 (0.53)	12.58	4.03 (0.49)	12.13	4.96	0.00*
Mandibula •Mandible						
Središnji sjekutić • Central incisors	4.96 (0.62)	12.43	4.95 (0.57)	11.48	0.20	0.83
Bočni sjekutić • Lateral incisors	5.23 (0.53)	10.17	5.11 (0.60)	11.65	2.34	0.04*
Očnjak • Canine	5.84 (0.59)	10.13	5.82 (0.63)	10.76	0.34	0.74
Prvi molar • 1 st molar	4.81 (0.70)	14.61	4.67 (0.64)	13.68	3.00	0.04*
Drugi molar • 2 nd molar	3.88 (0.61)	13.84	3.63 (0.43)	11.89	6.89	0.00*

*P vrijednost <0,05 je značajna; SD= standardna devijacija; CV=koeficijent varijance •

*P value <0.05 is significant, SD= standard deviation, CV=coefficient of variation

tića i očnjaka – oni su bili viši kod žena. Te razlike nisu bile statistički značajne (Tablice 2.-4.).

Najveća razlika u spolu širine MD-a bila je kod prvoga maksilarnog kutnjaka (4,01%), a najmanja kod bočnog maksilarnog sjekutića (-1,06%). Prvi mandibularni kutnjak imao je najveću razliku u spolu u vestibulo-oralnoj širini (3,82%). Maksilarni (4,96%) i drugi mandibularni kutnjak (6,89%) pokazali su najveću spolnu razliku u visini kliničke krune.

Rasprava

Dimenzije zuba korisno je znati u antropološkim, genetičkim, odontološkim, i forenzičnim istraživanjima žive i pokojne populacije (24). Zub je trodimenzionalan objekt i sastoji se od širine MD-a i VO-a te visine kliničke krune. Premda u većini objavljenih radova klinička visina krune nije opisana, učinjeno je to u ovom istraživanju kako bi se proučio prostorni oblik zuba i ocijenila njihova ukupna veličina.

Rezultati istraživanja pokazali su da se širine MD-a i VO-a povećavaju kod maksilarnih zuba progresivno od bočnog sjekutića do drugoga mliječnog molara, a u mandibuli od središnjih sjekutića do prvoga mliječnog kutnjaka, jer su središnji sjekutići veći u maksilarnom zubnom luku. Ti se podaci slažu s istraživanjima Liua, Dunga i Yanga (7), Abu-Alhaija i Qudeimata (10), Townsenda (14), Yemitana i suradnika (18), Hanihara (25) te Moyersa i njegovih kolega (26).

Meziodistalna dimenzija zuba

Aritmetičke sredine širine MD-a kod zuba u ovom istraživanju bile više od onih zabilježenih kod Jordaniana (10) i kod većine zuba američkih bijelaca (26). Aritmetičke sredine širine MD-a zuba bijelaca koje su dobili Moyers i suradnici (26) bile su niske u usporedbi s rezultatima ovog istraživanja, osim što su bile sličnih dimenzija kod maksilarnih očnjaka i muškaraca i žena. U mandibularnom zubnom luku vrijednosti za središnji i bočni sjekutić kod žena te očnjaci kod muškaraca i žena bili su slični rezultatima dobivenima u ovom istraživanju. Ukupni rezultat se svejedno može usporediti s australskim bijelcima (14) u aritmetičkoj sredini širine MD-a maksilarnih očnjaka i drugog i prvog kutnjaka kod obaju spolova. Mandibularni bočni sjekutić i drugi kutnjak kod muškaraca bili su sličnih dimenzija kao i u ovom istraživanju. Aritmetičke sredine dimenzija kod većine zuba bile su manje od onih nađenih kod Aboriđina (25). Ta nepodudarnost kod parova potvrđuje rezultate već obavljenih istraživanja o procjeni rasnih varijacija (8, 25). U skladu s tim, dobivene aritmetičke sredine za nigerijsku populaciju, bile su u skladu s rezultatima Yemitana i njegovih kolega (18).

U ovom istraživanju – kod spolova opažene razlike u mliječnoj denticiji, ponajprije u dimenziji MD-a – upozoravaju da se najveći dimorfizam javlja kod prvoga maksilarnog molara. Ti su rezultati suprotni onima nađenima kod australskih bijelaca (26) kod kojih je očnjak bio zub s najvećim razlikama kad je riječ o spolu. Rezultati se djelomice slažu s onima Harrisa i Leasea (8) – kod njih su prvi maksilarni kutnjak i

CCH of the maxillary lateral incisors and canines which were found higher in the females. These differences, however, were not statistically significant. (Tables 2-4)

The greatest MD gender difference was found in the maxillary 1st molars (4.01%) and the least was found in the maxillary lateral incisors (-1.06%). The mandibular 1st molars displayed the highest gender differences in the BL dimension (3.82%). The maxillary and mandibular 2nd molars displayed the highest gender differences in CCH 4.96% and 6.89% respectively.

Discussion

The knowledge of tooth dimension is useful in living and non living populations for anthropological, genetic, odontologic and forensic investigations (24). The tooth is 3-dimensional and consists of the mesiodistal, buccolingual and clinical crown height. Although Clinical Crown Height has not been reported in most of the previous studies, this was done in this study to assess the spatial extent of the tooth; evaluate the overall tooth size.

The findings in this study showed that the MD and BL dimensions increased progressively from the central incisors to the second primary molars in the mandibular arch, while the dimensions increased from the lateral incisors to the second primary molars since the central incisors were larger in the maxillary arch. This finding was similar to previous reports by Liu, Dung and Yang (7), Abu Alhaija and Qudeimat (10), Townsend (14), Yemitan et al (18), Hanihara (25) and Moyers et al (26).

Mesiodistal Tooth Dimensions

The mean mesiodistal tooth crown dimensions in this study were higher than those of Jordanians (10) and most tooth types in American Caucasians (26). Mean mesiodistal dimensions in the Caucasians as reported by Moyers et al (26) were low compared to the findings in this study except for the dimensions of the maxillary canines in the males and the females which were similar. In the mandibular arch the central incisors, lateral incisors in the females and canines in the males and females were similar to the results obtained in this study. The result is however comparable to those of Australian Caucasians (14) in the mean mesiodistal tooth crown dimensions of the maxillary canines and second primary molars in both sexes. The mandibular lateral incisors and second molars in males were also similar to that found in this study. The mean dimensions were smaller than those of the Aborigines in most tooth types (25). These disparities confirm previous studies assessing racial variations (8,25). However, the mean tooth dimensions were comparable to those of the Nigerian population reported by Yemitan et al (18).

In this study, the gender differences observed in the primary mesiodistal tooth crown dimensions showed that the greatest dimorphism were the maxillary first molars. This finding contradicts those of the Australian Caucasians (26) where the canine was observed to be the tooth with the greatest difference. However, it partially agrees with that of Harris and Lease (8) where the maxillary first molar and canine were reported to be the teeth with greater gender differences. The gender differences in mesiodistal dimensions were higher

očnjak bili zubi s najvećom razlikom uvjetovanom spolom. Razlike u spolu u širini MD-a bile su veće od zabilježenih kod tajvanske djece (7). To može biti rezultat rasnih, genetskih ili okolišnih varijacija čimbenika, metode odabira i korištenih instrumenata za mjerenje uzoraka. Premda su rezultati Harris i Leasea (8) pokazali da su prvi maksilarni molar i očnjak zubi s većim dimorfizmom, pregledavajući literaturu ustanovili smo da su sjekutići i molari zubi s najvećim dimorfizmom u dimenziji MD-a.

Vestibulo-oralna dimenzija zuba

Aritmetička sredina širine VO-a može se usporediti s onom kod australskih bijelaca (14), Indijaca (29) i Nigerijaca (18).

Razlika u dimenziji VO-a, ovisna o spolu, bila je u rasponu od -0,37% do 3,82%, pri čemu su mandibularni očnjaci i prvi molari pokazali najveću razliku u toj dimenziji krunice. Blackova (28) istraživanja mliječne denticije pokazala su da su najveće razlike među spolovima kod prvih maksilarnih kutnjaka. I Koora sa suradnicima (29) također je izvijestio o najvećoj razlici kod kutnjaka vezanoj za spol među Indijcima. Zub s najvećom razlikom u maksilarnom luku bio je očnjak, što se slaže s rezultatima istraživanja australskih bijelaca (14). Rezultati ovog istraživanja šireg su opsega nego oni pronađeni kod Tajvanaca (7).

Klinička visina krune

Očnjaci su imali najveće vrijednosti u oba zuba luka, a najmanje su imali drugi molari. Maksilarni molari bili su viši negoli mandibularni. Najveće razlike u kliničkoj visini krunice, ovisne o spolu, kretale su se između -2,84% i 6,89%. Drugi maksilarni (4,96%) i mandibularni (6,89%) molari imali su najveće spolno vezane razlike.

U ovom istraživanju najveće su dimorfične razlike uočene kod prvih maksilarnih kutnjaka u širini MD-a, prvih mandibularnih kutnjaka u širini VO-a i drugih mandibularnih kutnjaka u kliničkoj visini krunice zuba.

U Blackovim ispitivanjima mliječnih zuba (28) najveća je razlika vezana za spol nađena u širini VO-a prvih maksilarnih i drugih mandibularnih kutnjaka.

U literaturi je istaknuta najveća spolno vezana razlika kod trajnih očnjaka, a to se pripisuje utjecaju Y-kromosoma (2,15,27), premda nije toliko naglašena u mliječnoj denticiji (28).

To je uočeno u našem istraživanju u kojem 47,7 posto razlika ovisnih o spolu nije bilo statistički značajno. Razlog za te minimalne razlike može biti prenatalna mineralizacija tih zuba prije početka utjecaja steroida, izbjegavanje izlaganja velikih očnjaka prije no što je dijete sposobno obraniti se od napadača te očuvanje biološke energije, jer mliječni zubi nisu namijenjeni dugo služiti (8).

Ako imaju podatke o aritmetičkim sredinama svih triju dimenzija zuba, kliničari, liječnici dječje dentalne medicine i ortodonti mogu planirati terapije kako bi mogli raspolagati prostorom, poduzimati restaurativne zahvate, ispravljati malokluzije i određivati interseptivne terapije. Preoblikovane krune, poput čeličnih koje se koriste kao privremene kru-

than that observed in Taiwanese children (7). These may be as a result of the racial, genetic or environmental variation, the method in selection and instrument used in measuring of the samples. Although Harris and Lease report showed the maxillary 1st molar and canine with greater dimorphism, their review of the literature showed that the incisors and molars were the most dimorphic teeth mesiodistally.

Buccolingual Tooth Dimension

The mean buccolingual tooth crown dimensions are comparable to those found in Australian Caucasians (14), Indians (29), and Nigerians (18). The gender differences in the buccolingual dimensions ranged from -0.37% to 3.82% with the mandibular canines and first molars displaying the least and highest gender differences respectively in this tooth crown dimensions. Black's (28) studies on primary dentition showed that the greatest gender differences were found in the maxillary 1st molars and Koora et al (29) also reported the greatest gender differences to be in the molars among Indians. The tooth with the greatest gender difference in the maxillary arch was the canine and this agreed with that reported for the Australian Caucasian (14). The finding in this study was also of a wider range than that reported on the Taiwanese (7).

Clinical Crown Height

The canines had the largest dimensions in both maxillary and mandibular arches and the second molars were the least dimensions. The maxillary molars were larger than the mandibular molars. The gender differences in the clinical crown heights ranged between -2.84% to 6.89%. The maxillary and mandibular second primary molars displayed the highest gender differences of 4.96% and 6.89% respectively. .

In this study, the greatest dimorphic differences were observed in maxillary first molars, mandibular 1st molars and mandibular second molars in the mesiodistal, buccolingual and clinical crown (height) tooth dimensions respectively. Black's (28) studies on primary dentition showed that the greatest gender differences were found in the buccolingual dimensions of the maxillary 1st molar and 2nd mandibular molar.

In the literature the greatest gender differences were found to be in the permanent canines and this was attributed to the influence of Y chromosome (2,15,27), however, the gender differences are not so pronounced in the primary dentition (28). This was observed in our study where 47.7% of the gender differences were not statistically significant. The reason for this minimal difference may be attributed to prenatal mineralization of these teeth prior to steroid mediation, avoidance of any display of large canines prior to the child's ability to defend himself against aggressors and the conservation of biological energy since the primary teeth are not intended to function for a protracted period (8).

With the information on mean tooth dimensions in 3-dimensions, the clinician, the Paediatric Dentist and the Orthodontist can plan treatment regarding space management, operative dentistry and management of malocclusion,

ne i držači mjesta, ponekad kod Nigerijaca nisu primjerene. Ti rezultati osiguravaju ortodontima informacije o proizvodnji tih preoblikovanih kruna za nigerijsku populaciju. Rezultati ovog istraživanja mogu poslužiti kao temeljne vrijednosti za veličine mliječnih zuba kod Nigerijaca te se trebaju uvrstiti u bazu podataka kako bi poslužili u radu budućim stručnjacima.

Zaključci

Dobivene aritmetičke sredine dimenzija zubnih kruna mogu se usporediti s onima kod australskih bijelaca te Indijaca, ali manje negoli kod australskih Aboridina. Kada se usporede s Jordancima i američkim bijelcima, Nigerijci imaju veće mliječne zube.

i.e. interceptive treatment. The preformed crowns such as the stainless steel crowns used as temporary crown restorations and space maintainers are sometimes not appropriate for Nigerians. These results provide odontometric information in the fabrication of these preformed crowns for the Nigerian population. The findings from this study can serve as baseline values for the sizes of primary teeth in Nigerians and it will form a part of a data base for researchers and future research work on tooth dimensions.

Conclusion

The mean crown dimensions are comparable to those of Australian Caucasians and Indians but smaller than Australian Aborigines. When compared with Jordanians and American Caucasians, Nigerians tend to have larger primary tooth crown dimensions.

Abstract

Objective: To provide odontometric information in three dimensions; Mesiodistal, Buccolingual and Clinical Crown Height in the primary dentition of Nigerian children. **Materials and Method:** A sample of healthy 400 nursery school children aged 3-5 years old with fully erupted primary teeth were randomly selected from six public nursery Schools. Dental stone models were made from maxillary and mandibular alginate impressions of the population sample. Mesiodistal (MD), Buccolingual (BL) and Clinical Crown Height (CCH) measurements of teeth were done using electronic digital caliper. The descriptive statistics were obtained for all parameters using SPSS version 13. **Result:** A total of 8,000 teeth were measured. The mean MD and BL tooth crown dimensions increased progressively from the lateral incisors to the second primary molars in the maxillary arch while the dimensions increased from the central incisors to the second primary molars. The largest mean MD dimension was the mandibular primary second molar with 10.20mm+ 0.56, the maxillary second molar had the largest mean BL dimension of 9.74mm+0.58, while the mandibular canine had the largest mean CCH dimension of 5.83mm+0.61. The males had larger mean tooth dimensions in most tooth types. There were statistically significant differences between the tooth dimensions in both genders ($p < 0.05$) and variations within tooth classes. **Conclusion:** It can be concluded that Nigerians have larger primary tooth dimensions than Caucasians, Jordanians, Taiwanese and smaller primary tooth dimensions than Australian Aborigines but comparable to those of Indians.

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Address for correspondence

Dr. Joycelyn Eigbobo
College of Health Sciences,
University Of Port Harcourt
Department of Child Dental Health,
500001 Port Harcourt, Nigeria
odegwabobo@yahoo.com

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