Average Odontometric Value of the Width of the Upper Central Incisor in the Congolese Bantu of Kinshasa, Democratic Republic of Congo

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Abstract

Objective: The aim of this study was to determine the average values of width of the upper central incisor (WUCI) in Congolese Bantu and compare them to those of Caucasians and Asiatic. **Material and Methods:** It was a prospective cross-sectional study carried out at the Université de Kinshasa on the Congolese Bantu, Department of Dental Medicine, from March 2020 to March 2021. A maxillary imprint was taken by Jeltrate-type alginate. The measurement of two healthy upper central incisors (UCI) was carried out by the hard plaster casting type 4, with a brand caliper, carbon fiver composite mark. The study was approved by the Ethics Committee of the School of Public Health in the Université de Kinshasa and verbal consent was obtained from each participant. **Results:** The Average Width of the UCI was 8.74 mm ± 0.56. The average width of the right Upper Central incisor (RUCI) and the left UCI (LUCI) was 8.71 mm ± 0.57 and 8.77 mm ± 0.56, respectively. The

average width of the RUCI and LUCI was not the same for men and women (p 0.001). A significant difference was observed between the average of the RUCI and the 18 - 28 and 40 - 50 age group (p = 0.056) as well as for the average LUCI (p = 0.085). The width average of UCI between the Congolese Bantu with those of Caucasians and Asians was significantly different (p = 0.000 and p = 0.009). **Conclusion:** The average width of the RUCI and LUCI was different among sex and age group. The average width of UCI of the Congolese Bantu is different from that of Caucasians and Asians.

Keywords

1. Introduction

The dentist seems to have experienced difficulties in completing Removable Denture Prosthesis with regard to the choice of the width of the teeth, especially in case of lacking pre-extraction documents [1]. His experience seems to be focused on trial error or adaptation of dental dimensions blindly in order to meet the patient's requirements.

The width of the upper central incisor (WUCI) is one of the most difficult aspects to determine when choosing artificial teeth assembly [2] [3]. This requires on the part of the practitioner, a rationality basis on the clinical factors of the patient [4], as well as it requires the measurements that sometimes make a lot of mistakes [5] [6]. The WUCI varies by gender, race, and ethnicity [7] [8]. Some authors experienced that it has an equal value according to a jaw's quadrant while the opposite for others [9] [10] [11] [12]. A study in Brazil by Varyâo *et al.* in 2005 found that the WUCI in white and black was 8.57 mm and 9.14 mm respectively. On the other hand, it measured 8.71 mm and 8.6 mm respectively among mestizos and Asians [13]. Odontometric values provide its importance in human anthropology by determining the sex of a subject [10]. It's also involved in criminology or forensic dentistry (Forensics) for the identification of victims [14]. In the Democratic Republic of Congo, studies conducted in a hospital setting in Kinshasa show that edentulousness predominated and that the majority of partial or totally edentulous patients were non-carriers of dental prostheses [15] [16] [17]. The management of partial or total edentulous prosthesis interferes with the clinical and morphological factors determining the choice of anterior teeth, which are the aesthetics that contribute to the beauty of the smile [18] [19] [20]. The aim of the present study was to determine the normal values of WUCI in Congolese Bantu and to compare them to those of Caucasians and Asiatic.

2. Methods

A prospective cross-sectional study was carried out at the Université de Kinshasa, Department of Dental medicine, on the Congolese Bantu over a period from

March 2020 to March 2021. Subjects included in the study were at least 18 years of age with upper central incisors. People with diastema, previous breaches, dental wear, dental malpositions, or those who had prosthetic or orthodontic appliances in the anterior or anteroposterior area were excluded from the study. A maxillary impression was taken using Jeltrate-type alginate and the measurement of the healthy upper central incisor was carried out by the hard plaster casting type 4, with a brand caliper of carbon fiber composite mark, going from one point of contact to another (Figure 1). Sampling was non-probabilistic; convenience and the collected data were exported to Excel via an input mask made using epi-Data software version 3.1. Data processing and statistical analysis were carried out using the SPSS software version 26. The sociodemographic, clinical, and morphological variables were performed by univariates descriptive statistics as proportions for qualitative variables, and mean with their standard deviation or median and interquartile space for quantitative variables. Previously, the test of normality of the distribution of quantitative variables had been determined. In order to look for differences between quantitative and qualitative variables, the student's t-test and Analysis of Variances (ANOVA) were performed. When the analysis of variances was significant ($p \leq 0.10$), the Bonferroni Post-Hoc test was performed to identify the group that had a difference. The present study has been approved by the ethics committee of the School of Public Health of Université de Kinshasa under approval number ESP/CE/289/2019. The confidentiality of this study was respected by the anonymity of the participants identifies.


**Figure 1.** Maxillary impression and hard plaster casting type 4.

3. Results

Out of 315 subjects, only two hundred and twenty-six were selected, of which 50.4% were men and 49.6% were women (Table 1). The sex ratio was 1.016 (1 male to 1 female). The median age of the surveys was 25 years, EIQ (23 years; 28.5 years). The age group between 18 - 28 years was the most representative (75.2%). The most dominant provinces of origin were Kongo Central and Kwilu (Figure 2). The dominant facial shape was 31.4% muscle-like (Figure 3). The average width of the upper right central incisor (WURCI) was 8.71 mm ± 0.57 while that of the upper left central incisor (WULCI) was 8.77 mm ± 0.56. A significant difference between the LWUCI and RWUCI is observed in both men and women ($p < 0.01$) (Table 2). After the Bonferroni Post-Hoc Test, there was a difference in WRUCI between the 18 - 28 and 40 - 50 age groups ($p = 0.056$) as well as for WLUCI of subjects with age groups of 18 - 28 years, 29 - 39 years, and 40 - 50 years have a significant difference ($p = 0.025$ and $p = 0.085$) like shown in Table 3. No significant differences were observed between the WURCI and WULCI according to the provinces of origin of the respondents (Table 4) and it was equal for each facial morphology (Table 5). There is a difference between

Table 1. Sociodemographic.

Variables	Frequency (n = 226)	Percentage
Age (mediane + EIQ)	25 years (23 - 28, 5 years)	
Intervalle of age		
18 - 28 years	170	75.2
29 - 39 years	44	19.5
40 - 50 yars	5	2.2
51 et +	7	3.1
Sexe		
Male	114	50.4
Female	112	49.6
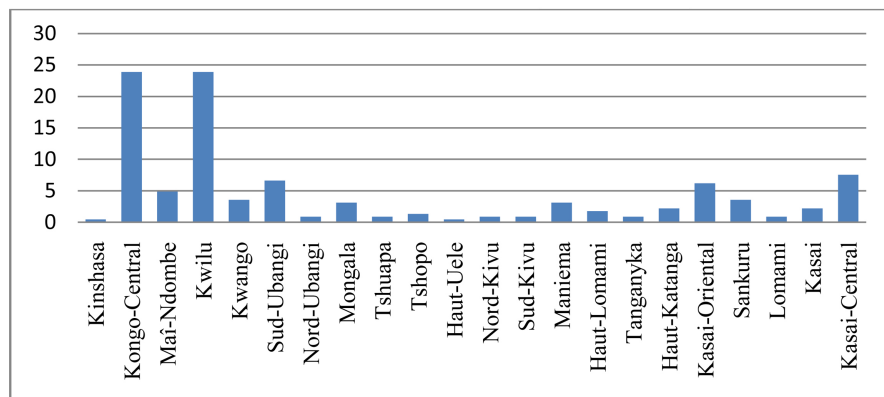
Figure 2. Distribution of respondents according to the origin province.
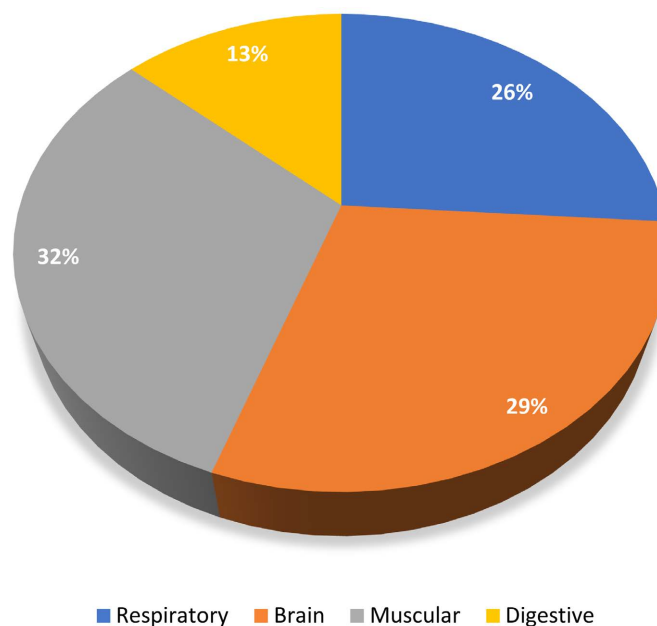
Figure 3. Distribution of respondents according to the morphological characteristic of the face.

Table 2. Comparison of the average of width upper central incisor according to sex.

Variables	Male		Female		t-test	p
	Avearage (mm)	ET (mm)	Avearage (mm)	ET (mm)		
WURCI	8.856	0.5637	8.555	0.5465	4.072	0.000*
WULCI	8.921	0.5601	8.612	0.5252	4.283	0.000*

Legend: WURCI: width of the upper right central incisor; WULCI: width of the upper left central incisor.

the average WUCI of Congolese Bantu with those of Caucasians (p = 0.000) and Asians (p = 0.009; p = 0.000) (Table 6).

4. Discussion

The management of partial or total edentulousness interferes with clinical and morphological factors in determining the choice of anterior teeth. The aim of this study was to determine the normal values of the width upper central incisor (WUCI) of the Congolese Bantu and compare it with other studies. The result of this study showed that the average width of the upper right central incisor (WURCI) was 8.71 mm ± 0.57 and 8.77 mm ± 0.56 for the width of the upper left central incisor (WULCI). A significant difference between WULCI and WURCI was observed in men than women (P < 0.01). The WURCI for the age group between 18 - 28 and 40 - 50 age groups was significantly different (p = 0.056) as well as WULCI for age groups of 18 - 28 years and 40 - 50 years, 29 - 39 years, and 40 - 50 years (p = 0.025 and p = 0.085). In addition, the value of

Table 3. Test post-hoc de Bonferroni and determination of WUCI according to age group (years).

Variables	Age (years)		Average Difference (I-J)	Standard Error	p
WURCI	18 - 28	29 - 39	0.11320856	0.0957	1.000
		40 - 50	0.6741*	0.2568	**0.056***
		51 et +	0.3255	0.2182	0.823
	29 - 39	18 - 28	−0.1132	0.0957	1.000
		40 - 50	0.5609	0.2671	0.221
		51 et +	0.2123	0.2303	1.000
	40 - 50	**18 - 28**	−0.6741*	0.2568	**0.056***
		29 - 39	−0.5609	0.2671	0.221
		51 et +	−0.3486	0.3313	1.000
	51 et +	18 - 28	−0.3255	0.2182	0.823
		29 - 39	−0.2123	0.2303	1.000
		40 - 50	0.3486	0.3313	1.000
WULCI	18 - 28	29 - 39	0.0816	0.0938	1.000
		40 - 50	0.7288*	0.2517	**0.025***
		51 et +	0.2945	0.2139	1.000
	29 - 39	18 - 28	−0.0816	0.0938	1.000
		40 - 50	0.6473*	0.2618	**0.085***
		51 et +	0.2130	0.2257	1.000
	40 - 50	**18 - 28**	−0.7288*	0.2517	**0.025***
		29 - 39	−0.6473*	0.2618	**0.085***
		51 et +	−0.4343	0.3248	1.000
	51 et +	18 - 28	−0.2945	0.2139	1.000
		29 - 39	−0.2130	0.2257	1.000
		40 - 50	0.4343	0.3248	1.000

Table 4. Comparison of the average of width upper central incisor according to region.

		Sum of square	ddl	Medium square	F	p
WURCI	Intergroups	3.326	10	0.333	1.009	0.437
	Intragroups	70.843	215	0.330		
WULCI	Intergroups	4.041	10	0.404	1.288	0.238
	Intragroups	67.434	215	0.314		

Legend: WURCI: width of the upper right central incisor; WULCI: width of the upper left central incisor.

Table 5. Comparison of the average of width upper central incisor according to the face morphology.

		Sum of square	ddl	Medium square	F	p
WURCI	Intergroups	1.185	3	0.395	1.202	0.310
	Intragroups	72.984	222	0.329		
WULCI	Intergroups	1.107	3	0.369	1.165	0.324
	Intragroups	70.367	222	0.317		

Table 6. Comparison of the average of width upper central incisor according to others studies (literature).

Maxilla					
WUCI (mm)				Test-t	p
Average (mm)	SD (mm)	Average from literature (mm)			
8.74	0.56	8.4 (Turkey/Europe)		9.065	0.000*
8.74	0.56	8.64 (Arabie-Saoudite/Asia)		2.617	0.009*
8.74	0.56	7.8 (Indian/Asia)		25.186	0.000*

WUCI of Congolese Bantu was different compared to those of Caucasians ($p = 0.000$) and Asians ($p = 0.009$; $p = 0.000$).

The study sample was slightly predominated by males with 50.4%. Our results are similar to those of Gueye *et al.* in Senegal in 2015, who found that 53.3% of the population was men [21]. On the other hand, it is different from the study conducted by Attokaran *et al.* (2021) and Tejavi *et al.* (2018) in India; which found an equal percentage between the two sexes [10] [22]. The character of mistrust in women could be the main cause. The majority of our study population was in the young age group of 18 - 28 years (75.2%). Our result is different from the study conducted by Attokaran *et al.* in 2021 in India where the age range of 18 - 25 years and that of 40 - 50 years were the same. It is from the age of 18 and over that dental growth is complete [23]. In this study, muscle type accounts for 31% followed by brain type with 29.2%. Our results are in contradiction with those of Jain *et al.* [24] in India in 2010, which found 67% had the ovoid form and 20% the Carrée form. We base ourselves on the classification of the visage according to the Sigaud typology [25], the Muntu is generally robust and therefore muscular.

In addition, the average WURCI was 8.71 mm ± 0.57, and 8.77 mm ± 0.56 for WULCI and the average of WURCI in males was 8.88 mm ± 0.56 and 8.55 mm ± 0.54 for females. The present results corroborate with those of Pillal *et al.* in India [11] which showed that the average of WUCI in men was significantly different than in Indian women and contrary to the result of Khalaf in 2009 in Irak; who found not different in Iraqi men than women [26]. This proves that sex is

an important parameter in the differentiation of the means of the width upper central incisor in Congolese Bantus [27] [28]. Our study shows a significant difference in the average WURCI for age groups between 18 - 28 years and 40 - 50 years (p = 0.005). The same for average WULCI in the age group between 18 - 28 and 40 - 50 age (p = 0.025); and 29 - 39 years and 40 - 50 years (p = 0.085). Our results are in the same direction as those of Attokaran *et al.* [22] in 2021. Growth in age could gradually lead to a reduction in LICS by attrition [29].

The average WUCI among Congolese Bantu has significant differences compared to Caucasians and Asians, in line with the study of Varyâo *et al.* Brazil in 2005; which showed a difference in the average WUCI among Caucasians, blacks, mestizos and Asians. Certain factors such as race, genetics, culture, and environment can influence the morphology and size of the tooth [26]. The main limitation of the present study remains the type of non-probability sampling, which does not allow to generalization of the results obtained in this study. It is, nevertheless, the first study to determine the WUCI of the Congolese Bantu, thus laying the foundations for rehabilitation in the design of the choice of artificial teeth during prosthetic oral rehabilitation.

5. Conclusion

The average of the WURCI is more different than WULCI according to sex and age group. The average WUCI in Congolese Bantu is different from that of Caucasians and Asians. Adaptation of the average width of UCI in the Congolese Bantu for relationship of the artificial teeth is necessary to maximize the satisfaction of previous edentulous patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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