

Facial Soft Tissue Profile Ikwerre Children between 5 to 12 Years

Loveday E. Oghenemavwe^{1,*}, Clinton D. Orupabo², Kingsley M. Azuh¹

¹Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of Port Harcourt, Choba, Nigeria

²Department of Anatomy, Faculty of Basic Medical Sciences, College of Medicine, Rivers State University, Nkpolu-Oroworukwo, Nigeria

Abstract The aim of the study is to quantify the facial soft tissue profile of Ikwerre children between the ages of 5 and 12 in a population sample of 202 persons (101 males and 101 females) randomly selected from various Children Centre in Port Harcourt. Standard photographic measurements were taken in the natural head position to determine the mentocervical angle (MCA), angle of facial convexity (AFC) and angle of total facial convexity (ATFC). The data obtained were tested with z test, student t test and Anova at 0.05 statistical significant levels. The mean value for the MCA for boys and girls were 92.67 degrees and 93.26 degrees respectively; AFC was 161.27 degrees for boys and 159.94 degrees for girls; ATFC for boys and girls were 150.77 degrees and 151.51 degrees respectively. The mean MCA for the lowest age group studied (5 – 6 years) was 95.67 degrees for boys and 94.44 degrees for girls whereas that for the highest age group (11 – 12 years) was 90 degrees for boys and 90.35 degrees for girls. There was no significant difference ($p>0.05$) in the mean for boys and girls irrespective of age. AFC in children between 7-8 years and MCA in children between 9-10 years showed significant statistical difference ($p<0.05$) in the mean for boys and girls. Comparison amongst the age groups showed that MCA in boys and ATFC in girls showed significant ($p<0.05$) variations. In conclusion, the lower jaw of Ikwerre children is slightly retrusive, AFC in children between 7-8 years and MCA in children of 9-10 years showed sexual dimorphism. The data will be useful to medical specialty involved in the treatment of the face as well biomedical anthropologist.

Keywords Ikwerre, Facial profile, Soft tissue

1. Introduction

The Ikwerre tribe is one of the largest ethnic groups in Niger delta region of Nigeria having a major stake in the economic and political roles of the region. They are predominantly farmers, and also take up fishing being the major occupation of its environs. They occupy a major landscape of the region. [1, 2] The face is the anterior aspect of the head and occupies in the longitudinal direction from the hairline of the forehead to the chin and from the right to the left ear transversely. The face carries very important structures which include the eyes, the nose, the mouth and the ears. It defines the identity and appearance of any individual. [3] Hence obvious changes in the anatomy of the face could be quite remarkable as to changing ones outward look. The basic shape of the face however is determined by the underlying bones, though the soft tissues determine primarily the aesthetics and appreciation of an individual. The individuality of the face results from anatomical differences: variations in shape and relative prominence of

the features of the underlying cranium, fat deposition, effects of aging and skin colour as well as hair distribution. Other factors that could contribute to facial variations include nutrition, health related issues including old facial scars from road traffic accidents and facial surgeries. Facial soft tissues could vary with age and sex following muscular and skeletal development. As a child advances in age, it is expected that the body proportions including the face would change proportionately except where alterations are caused by natural and acquired conditions. [4, 5]

Previous studies on facial dimensions have been able to elaborate what could be obtainable from different groups on a wider scale. For instance, Oladipo *et al.* [6] measured the craniofacial dimensions of Ijaw children and adolescents in Nigeria with normal facial morphology using some parameters like; nasal height, maxillary height, mandibular height, orofacial, facial and head circumference and established that males had significantly higher values than females for all parameters. Akpa *et al.* [7] established in a study of the Igbos that nasal heights for both male and female were 6.31cm and 6.04cm respectively. A study by Subtenly, [8, 9] on the soft tissue facial structures and their profile characteristics of subjects between 3months to 18years showed that some soft tissue profile follows proportionately skeletal growth with age. Torlakovic *et al.* [10] reported on

* Corresponding author:

loveday.oghenemavwe@uniport.edu.ng (Loveday E. Oghenemavwe)

Published online at <http://journal.sapub.org/ajmms>

Copyright © 2018 Scientific & Academic Publishing. All Rights Reserved

the age-related changes of the soft tissue profile from the second to fourth decades of life and established that significant changes occurred in the soft tissue facial profile from the second to the fourth decades, and that aging of the male facial profile began 10 years later than for the females; however, when the changes did occur, they were of greater magnitude. Photographic facial soft tissue analysis of adolescent Persian population by means of linear and angular measurements showed that the labial, nasal and chin areas are sexually dimorphic with males having greater facial heights, larger faces, and longer nasal, labial and chin lengths. Sandra et al. [12] analyzed the soft tissue facial profile of 110 dental students of University of Zagreb, Croatia and reported that all angles were larger in females. While there are studies of the facial soft tissue profile of adults in many ethnic groups in Nigeria that for children are very rare. This study seeks to quantify the facial soft tissue profile of Ikwerre children between the ages of 5-12 years using angular dimensions.

2. Materials and Methods

The sample size for this study consisted of 202 children (101 males and 101 females) from Ikwerre extraction between the ages of 5-12 years, who were randomly selected

from Children Centres in Port Harcourt. The parents and 4 grandparents of the children were from Ikwerre ethnic group. Written informed consents were obtained from parents/guardians and children who were able to read and write. The volunteers had aesthetic pleasing face as adjudged by two persons, no craniofacial deformities and any history suggesting a previous orthodontic treatment or rhinoplasty. Questionnaires and verbal interview were used to obtain information such as; sex, age and ethnicity of the parents and medical history. The photographs were taken and analyzed with Pro-image software as reported in our earlier studies. [13-15] Facial dimensions measured were mentocervical angle (MCA) which is a vertical line tangent to the forehead running through the glabella and pogonion, and intersecting a second line tangent to the menton; the angle of total facial convexity (ATFC), which is the angle formed at the intersection of two lines drawn from the glabella to the pronasale, and then to the gnathion; and the angle of facial convexity (AFC), which is formed between the glabella, subnasale and gnathion. The data were analyzed for descriptive statistics, paired t test was used to evaluate reliability of measurements, Z and independent t tests were used to evaluate the differences in mean of males and females, while Anova test was used to determine variation among the age groups.

Table 1. Descriptive statistics and comparison of the mean between males and females irrespective of age group

Parameters	N	Sex	Mean	SEM	SD	Variance	Z score	Critical z score at 0.05 level	Inference
AFC	101	M	161.27	0.74	7.40	54.69	1.36	1.96	NS
	101	F	159.94	0.65	6.50	42.21			
ATFC	101	M	150.77	0.63	6.33	40.05	0.93	1.96	NS
	101	F	151.51	0.49	4.90	23.99			
MCA	101	M	92.67	0.90	9.02	81.38	0.48	1.96	NS
	101	F	93.26	0.83	8.38	70.39			

AFC- Angle of facial convexity, ATFC- Angle of total facial convexity, MC- Mentocervical angle, NS- Not significant, Sig- significant, SEM- standard error, SD- standard deviation

Table 2. Descriptive statistics and comparison of mean of males and females for each age group

Parameters	Age group	Males			Females			p-value
		N	Mean	SD	N	Mean	SD	
MCA	5-6	31	95.67	8.44	29	94.44	9.08	0.59
AFC	5-6	31	161.00	6.73	29	160.20	6.56	0.60
ATFC	5-6	31	151.70	7.30	29	153.58	4.74	0.24
MCA	7-8	22	95.02	8.63	22	93.87	6.95	0.63
AFC	7-8	22	162.37	5.71	22	158.16	7.36	0.04*
ATFC	7-8	22	152.85	7.08	22	149.26	4.77	0.06
MCA	9-10	21	89.21	8.69	26	94.10	7.84	0.05*
AFC	9-10	21	162.09	6.81	26	160.79	4.97	0.48
ATFC	9-10	21	148.74	4.78	26	151.34	4.07	0.06
MCA	11-12	27	90.00	8.96	24	90.35	9.12	0.89
AFC	11-12	27	160.04	9.62	24	160.35	7.12	0.90
ATFC	11-12	27	149.54	4.93	24	151.24	5.27	0.24

MCA = Mentocervical angle, AFC = Angle of facial convexity, ATFC = Angle of total facial convexity, n = sample size, * significant difference

Table 3. Anova test for variation among age groups

Parameter	Sex	F value	F Critical	P-value
MCA	Males	3.74	2.70	0.01*
AFC		0.50	2.70	0.68
ATFC		2.16	2.70	0.10
MCA	Females	1.29	2.70	0.28
AFC		0.74	2.70	0.53
ATFC		3.57	2.70	0.02*

MCA = Mentocervical angle, AFC = Angle of facial convexity, ATFC = Angle of total facial convexity, n = sample size, * significant difference

3. Results

The intra-observer variation in measurement were in strong agreement as revealed by statistical insignificant ($p > 0.005$) differences in the mean. Table 1 shows the mean angular dimensions of the soft tissue facial profile irrespective of age group. There was no significant difference ($p > 0.05$) in the mean of boys and girls. There was a decrease in AFC (160.04 degrees) in children between the ages of 11-12. AFC in children between 7-8 years and MCA in children of 9-10 years showed significant statistical difference ($p < 0.05$) in the mean for boys and girls (see table 2). Among the age groups, MCA in males and ATFC in females showed significant ($p < 0.05$) variations (see table 3).

4. Discussion

This study investigated the facial soft tissue profile of Ikwerre children between 5 -12 years using the angle of facial convexity, the angle of total facial convexity and the mentocervical angle using standard photogrammetric recordings in the natural head position.

The mean value recorded in this study for MCA for males and females were 92.67 and 93.26 degrees respectively. MCA in conjunction with the nasofrontal angle are important in the evaluation of anteroposterior facial dysplasia and the prominence of the chin. [16] The result showed that children between 5-12 years have a lower jaw that is retrusive than the face. This is because in children, the jaw bone is still growing and full permanent dentition is not complete. There are reports of increase prominence of soft tissue thickness in the lower face especially around the chin of females between 7 to 9 years when compared to males. However beyond this age, there are evidence that soft tissue over the chin in males is greater than that of females. [17, 18] Although MCA is slightly higher in the female population, the difference is not significant ($p > 0.05$). This buttresses the fact that there is little or no gender dimorphism in the soft tissue relation over the menton to the cervical line in this age group. A critical evaluation of MCA for each age group shows a decline (95.67 degrees for males and 94.44 degrees for females of age group 5 – 6 years; 90 degrees and 90.35 degrees for

males and females for age 11-12 years). The growth of the mandible and surrounding tissues results in a straighter profile or protrusion of the lower jaw especially amongst Africans and it changes the MCA from obtuse angle to an acute angle seen in adults. Although soft tissues do not necessarily follow the same pattern of growth of the underlying skeletal tissues, a study suggest it increases with increasing age and remain comparatively stable in its convexity. [19]

For facial examination, the angle of facial convexity assesses the convexity/concavity of the profile. There is a little at variance when considering these angles for each of the age group as decline or rise appears not to be consistent with age in this study. This study may not effectively explain the reason for the rise and decline because it wasn't a longitudinal study, as human growth is controlled by polygenetic traits and other factors such as nutrition. Bishara *et al.* [20] using subjects between 5 and 25 years, demonstrated that the angles increased by 3.0 degrees in males and 1.9 degrees in females. After 25 years, the angle of facial convexity decreased by 2.8 degrees in males and 2.6 degrees in females. [8, 21] The angle of facial convexity excluding the nose (G-Sn-Pg) in this study do not show sexual dimorphism and this is similar to the findings of Fernandez – Riveiro *et al.* [22] and Arnett and Bergman. [23, 24]

ATFC in this study was 150.77 degrees for males and 151.51 degrees for females. It showed no gender difference. This is in agreement with the findings reported by Subtenly [8], Cox & Van der Linden. [25] Nanda *et al.* [26] and Arnett *et al.* [27] Anic-Milosevic *et al.* [28] studied ATFC in Croatians and reported the mean values for males and females to be 130.5 and 130.2 degrees respectively and that there were no significant gender variation. Similar assertion was made by Yuen and Hiranaka. [29] The variation in ATFC in each of the age group for females is significant. This may be due to the faster growth in the lower face of girls within this age compared to boys. There was inconsistent decrease in ATFC for each of the age group in males and females. Bishara *et al.* [20] reported that between 25 and 45 years, the angle increased by 2.1 and 1.3 degrees in males and females respectively, reflecting either a more vertical growth of the tip of the nose or a more forward movement of soft tissue pogonion.

5. Conclusions

In conclusion, this study has therefore quantified the soft tissue profile of Ikwerre children between 5-12 years. The lower jaw of Ikwerre children is slightly retrusive, AFC in children between 7-8 years and MCA in children of 9-10 years showed sexual dimorphism, MCA in males and ATFC in females varied significantly amongst the age groups. The data will be useful to medical specialty involved in the treatment of the face as well biomedical anthropologist.

REFERENCES

- [1] Nduka, O. Studies in Ikwerre History and Culture. Vol. One. Ibadan: Kraft Books Ltd: 1993.
- [2] Ogwutum, S. Outstanding Customs of Ikwerre People. Vol. One. Port Harcourt: Orn-Dax Printing Press. Schwartz: 1996.
- [3] Moore KL, Dalley AF, Agur AM. Clinically oriented anatomy, 6th ed. Lippincott Williams and Wilkins: 2006 pp 842-843.
- [4] Hellman M. The face in its developmental career. Dental Cosmos 1935; 75: 685-689.
- [5] Porfit WR, Fields HW, Sarver DM. Contemporary Orthodontics. 5th edition, Mosby, St Louis USA. 2013.
- [6] Oladipo GS, Esomonu C, Osogba IGO. Craniofacial dimensions of Ijaw children and adolescents in Nigeria. Biomedicine International 2010; 1: 25-29.
- [7] Akpa AC, Ugwu C, Maliki OA, Maliki SO, Morphometric study of the Nasal parameters in Nigerian Igbos. J.Expt & Clin. Anat, 2003; 2(2): 24-25.
- [8] Subtenly JD. A longitudinal study of soft tissue facial structures and their profile characteristics defined in relationship to underlying skeletal structures. Am. J Ortho, 1959; 45: 481-507.
- [9] Subtenly JD. The soft tissue profile, growth and treatment changes. The angle Orthodontist, 1961; 31(2): 105-122.
- [10] Torlakovic L, Fearovig E. Age related changes of the soft tissue profile from the second to the fourth decades of life. The Angle Orthod., 2011; 81 (1): 50-57.
- [11] Moshkelgosha V, Fathinejad S, Pakizeh Z, Shamsa M, Golkari A. Photographic facial soft tissue analysis by means of linear and angular measurements in adolescent Persian population. Open Dent J, 2015; 9: 346-356.
- [12] Anic-Milosevic S, Mestovic S, Lapter-Varga Ma, Dumancic J, Slaj M. Analysis of the tissue profile in Croatians with normal occlusions and well balanced faces. European Journal of Orthodontics, 2011; 33, 305-310.
- [13] Oghenemavwe EL, Osunwoke EA, Ordu KS, Omovigho O. Photometric analysis of soft tissue facial profile of adult Urhobos. Asian Journal of Medical Sciences 2010; 2(6): 248-252.
- [14] Oghenemavwe EL, Fawehinmi HB, Udoaka AI, Oladipo GS, Onyeleonu I. Photogrammetric analysis soft tissue profile of the face of Igbos in Port Harcourt. Asian Journal of Medical Sciences, 2011; 3(6): 228-233.
- [15] Oghenemavwe EL, Fawehinmi HB, Daewin TL. A Software tool for facial analysis. Research Journal of Applied Sciences, Engineering and Technology. 2012; 4(6): 551-556.
- [16] Bergman RT. Cephalometric soft tissue facial analysis. AM.J. Dentofac. Orthoped., 1999: 116 (40): 373-389.
- [17] Genecov JS, Sinclair PM, Dechow PC. Development of the nose and soft tissue profile. Angle Orthodontist, 1990: 60(3) 191-198.
- [18] Nanda RS. The rate of growth of several facial components measured from serial cephalometric roentgenogram. American Journal of Orthodontics, 1955 41(9):658-673.
- [19] Sharma P, Arora A, Valiathan A. Age changes of jaw and soft tissue. The Scientific World Journal. 2014:301501. doi: 10.1155/2014/301501.
- [20] Bishara SE, Jakobsen JR, Hession TJ, Treder JE. Soft tissue profile changes from 5-45 years. Am.J. OrthoDentofacial. Orthop, 1998; 114 (6): 698-706.
- [21] Mauchamp O, Sassouni V. Growth and prediction of the skeletal and soft tissue profiles. American Journal of Orthodontics 1973; 64: 83-94.
- [22] Fernandez-Riveiro P, Smyth-Chamosa E, Suarez-Quintanilla D, Suarez-Cunqueiro M. Angular photogrammetric analysis of the soft tissue facial profile. European Journal of Orthodontics, 2003; 25: 393-399.
- [23] Arnett GW and Bergman RT. Facial keys to orthodontic diagnosis and treatment planning- Part 1. American J. Orthodontic Dentofac. Orthoped, 1993a; 103:299-312.
- [24] Arnett GW, Bergman RT. Facial keys to orthodontic diagnosis and treatment planning- part 11. American Journal of Orthodontics and Dentofacial Orthopedics 1993b; 103: 395-411.
- [25] Cox NH, Van der LFGPM. Facial harmony. American Journal of Orthodontics 1971; 60: 175-183.
- [26] Nanda RS, Meng H, Kapila S, Goohuis J. Growth changes in the soft tissue facial profile. Angle Orthodontist, 1990; 60: 177-190.
- [27] Arnett GW, Jelic JS, Kim J, Cumming DR, Beress A, Wroley CM jr, Chung B, Bergman R. Soft tissue cephalometric analysis: diagnosis and treatment planning of Dentofacial deformity. American Journal of Orthodontics and Dentofacial Orthopedics. 1999 116: 239-253.
- [28] Anic-Milosevic S, Lapter-Varga M, and Slaj M. Analysis of the soft tissue facial profile by means of angular measurements. European Journal of Orthodontics, 2008; 30 (7) 135-140.
- [29] Yuen SWH, Hiranaka DK. A photographic study of the facial profiles of southern Chinese adolescents. Quintessence International 1989; 20: 665-676.