



Research Report

Exploration of thyromental distance variation in relation with the height, body weight and sex in two ethnic groups of Akwa Ibom State, Nigeria

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(Received 21 November 2023; Accepted 15 February 2024; Published 16 May 2024)

Abstract - The study aimed at investigating the thyromental distance variation in relation with the height, body weight and sex among adults of the two major tribes (Ibibio and Annang) of Akwa Ibom state, Nigeria. This is to ascertain the possible difficult intubation that could be experienced by any of the two tribes. Additionally, the study also aimed to examine the eventual medical and/or anthropological repercussions of this variation. A total of 300 volunteers within the two tribes consisting of 48% males and 52% females, aged between 18-50 years were measured. Results showed a progressive increase in the thyromental distance (TMD) as age increases within the age brackets of 26-30 and 31-35 years respectively, and a decrease within the age bracket of 46-50 years. Notable variation was seen across the ethnic groups. Annang males within the age grade of 21-25 years had the highest thyromental distance greater than 6.5 cm. Moreover, our result revealed that, Annang males have a higher thyromental distance than the Ibibio males, while Ibibio females have a higher thyromental distance than the Annang females. However, there was a large percentage difference between the sexes and the thyromental distances varied across the ethnic groups, with significant differences between ages, height and body weight observed within the Ibibios and Annangs. Conclusively, our findings revealed that the Annang citizens are taller and heavier than their Ibibio counterparts.

Keywords: Thyromental Distance, Annang, Ibibio, Males, Females, Ethnic Groups.

Introduction

The thyroid cartilage is the largest cartilage of the larynx derived from the 4th pharyngeal arch. It lies at the level between 4th and 5th cervical vertebrae. Thyroid cartilage forms the anterior wall of larynx and protects the vocal cords. The thyroid cartilage is made up of laminae which unite anteriorly to form a laryngeal prominence called Adam's apple which is more prominent in males than in females. Superior to this prominence, the laminae diverge to form a V-shaped thyroid notch. Posteriorly, the laminae form superior and inferior cornua (Chakravarthi *et al.* 2013). The thyrohyoid membrane is attached to the superior border of the thyroid laminae and the inferior border of hyoid bone. Inferiorly, the thyroid cartilage forms a joint with the cricoid cartilage with the cricothyroid ligament at the center. The joint between the inferior thyroid cornu and the cricoid cartilage is synovial, with a capsular ligament strengthened by a fibrous band posteriorly. The rotation of the cricoid cartilage on the inferior thyroid cornu is around a transverse axis. The cricoids cartilage also glides on the inferior thyroid cornua, meaning that the main movements of these joints are rotation and gliding of the thyroid cartilage, which result in changes of the vocal cords (Moore and Dalley 1999). The laminae of thyroid cartilage also serve as attachment sites for several muscles in the neck (Mupparapu and Vuppalapati 2005). Thyroid cartilage is a hyaline cartilage which may undergo endochondral ossification and calcification as aging process (Chakravarthi *et al.* 2013). The mineralization of human thyroid cartilage occurs usually after the end of adolescence. In both sexes, the ossification of thyroid cartilage begins at the posterior border, the lower margin and the inferior horn (Kirsch and Claassen 2000).

The ossification of thyroid cartilage commences about the 25th year and by the 65th year, the cartilage may be completely converted into bone in males. In females, thyroid cartilage never ossifies completely as the ventral half remains cartilaginous (Salman and Kinney 1990). The presence of the chin is already noticeable in the 5th fetal month (Schwartz and Tattersall 2000) and the mandible retains these characteristics into adult life (Coquerelle *et al.* 2010).

The thyromental distance (TMD) was defined by Patil, as the distance from the thyroid notch to mental prominence with the head fully extended. It is considered a test of mandibular space and reflects the ease by which the tongue may be displaced using a standard laryngoscope blade (Randell 1996). A distance greater than 6.5 cm is rarely associated with difficulty. Distance between 6 cm to 6.5 cm may be associated with difficult

laryngoscopy but intubation is usually possible. A thyromental distance of less than 6.0cm suggests that intubation using conventional, direct laryngoscopy may be very difficult or impossible (Shiga *et al.* 2005).

These cut-off values are disputed and widely studied (Fritscherova *et al.* 2011). However, both short and long thyromental distance measurements may be associated with difficult intubation. The thyromental distance (TMD), which is measured along a straight line from the thyroid cartilage prominence to the lower border of the mentum with full head extension, is a common method to predict difficult airways (Greenland *et al.* 2010). The smaller, the thyromental distance, the greater, the probability of a difficult airway (Connor and Segal 2014). However, the reported predictive values vary greatly. The sensitivity of the thyromental distance varies from 15% to 95%, and the specificity of the thyromental distance varies from 24% to 98% (Aktas *et al.* 2015). The cut-off points of thyromental distance also differ greatly. Most scholars suggest that the cut-off point should be 7.0 cm (Frerk 1991), 5.5 cm (Wong and Hung 1999), 4.0 cm (Ayoub *et al.* 2000), 6.0 cm (Shiga *et al.* 2005) while others have considered cut-off point of 6.5cm in a normal adult (Jeon *et al.* 2011). Studies have shown that localization of the front of the neck landmarks may be prone to error and the accuracy of the positioning of the cricothyroid membrane is very low (Aktas *et al.* 2015).

Both large and small thyromental distance can predict difficult laryngeal intubation (Benumof 2003). A large thyromental distance equates with an anterior larynx that is at a more obtuse angle and also results in too much space for the tongue to be compressed in a laryngoscopic blade. A large thyromental distance is an indicator of difficult intubation, mask ventilation, as well as an indicator of obstructive sleep apnea (Chou and Wu 2003). In some individuals, the caudal descent of the larynx is relatively long, which causes a large part of the tongue to be in the hypopharynx, resulting in a long thyromental distance which is an indicator of difficult laryngeal intubation (Chou and Wu 2001).

A small thyromental distance equates with an anterior larynx that is at a more acute angle which result in less space for the tongue to be compressed in a laryngoscopic blade. Secondly a small thyromental distance has been correlated with difficult direct laryngoscopic intubation in adult patients (Tripathy and Pandey 2006). A small thyromental distance could be seen in individuals with short neck or long neck.

During the evolution of the human species (phylogeny), the larynx descends in a caudal direction, which result in a separation of the uvula from the epiglottis and creates a soft-walled pharyngeal chamber that allowed the development of resonance and harmonics

that are necessary for speech and singing as well as many cases of obstructive sleep apnea (Barsh 1999). During descent of the larynx, the vocal cords remained directly posterior to the midpoint of the thyroid cartilage. In the development of a human individual from a neonate to an adult (ontogeny), the larynx descends caudally just as it did during evolution of the human species (ontogeny recapitulates phylogeny). The descent of the larynx during development is relatively small and the mandible is short, this leads to a small thyromental distance which is an indicator of difficult intubation (Chou and Wu 2001).

A large thyromental distance makes the voice deeper, against the small one. This is due to the lengthening and shortening of the vocal cords (Pressman 1942). In a small thyromental distance, the distance between them is approximated which is not very good, while in a large thyromental distance, this distance is lengthened and widened which may slacken the thyrohyoid membrane between the thyroid cartilage and the hyoid bone which are the two basic structures of the neck region (Maguire and Dayal 1974).

The thyromental distance provides an optimal combination in predicting difficult visualization of the larynx (Merah *et al.* 2005). Important structures are located between the thyroid cartilage and mental symphysis. Compression of these structures may be fatal, which makes the thyromental distance, an important landmark in the neck region. Structures between thyroid cartilage and the mental symphysis include muscles such as mylohyoid, stylohyoid, geniohyoid, thyrohyoid and omohyoid. These muscles perform specific functions and therefore loss of their functions is detrimental to the neck in particular and to the body in general. Other structures include the hyoid bone, thyrohyoid membrane and nerves such as the superior laryngeal nerve, hypoglossal nerve, nerve to mylohyoid, motor nerve to the intrinsic and extrinsic muscles of the tongue (Moore and Dalley 1999). Also, vessels such as the superior laryngeal artery, part of the facial artery, part of the facial vein, superior laryngeal veins and veins uniting to form the anterior jugular vein are also found between them. Moreso, sublingual papilla, sublingual fold and the submandibular duct are also among structures between the thyroid cartilage and the mental symphysis (Williams *et al.* 1989). Finally, nodes like the submental, submandibular, jugulo-omohyoid, transverse cervical and the prelaryngeal lymph nodes are structures also found between the thyroid cartilage and the mental symphysis (Seeley *et al.* 2006). Thus, knowledge of thyromental distance is of utmost importance to the anesthetists, including the ear, nose, throat Surgeons and other clinicians. Human height is the distance from the bottom of the feet to the top of the head in a human body, standing erect. It is measured using a stadiometer, in centimeters when using the metric system, or

feet and inches. In the early phase of anthropometric research history, questions about height techniques for measuring nutritional status often concerned genetic differences. Height is also important because it is closely correlated with other health components, such as life expectancy. Studies show that there is a correlation between small stature and a longer life expectancy (Clemente 1985). The human body weight is a person's mass. Body weight is the measurement of weight without items located on the person's body. Practically, body weight may be measured with clothes on the body but without shoes or heavy accessories such as mobile phones and wallets, using manual or digital weighing scales. Excess or reduced body weight is regarded as an indicator of determining a person's health, with body volume measurements providing an extra dimension by calculating the distribution of body weight. Average adult human weight varies by continent from about 60 kg (130 lb) in Africa and Asia (Pai *et al.* 2000).

This study was designed to determine the importance of thyromental distance in relation with height and body weight of Ibibio and Annang ethnic groups of Akwa Ibom State, Nigeria. Therefore, this study is significant because the result obtained from this research would enable researchers to proffer useful suggestions to the ailing problems of poor laryngoscopy which is an indicator of difficult intubation. The research would be of immense use to anesthesiologists to predict difficulty at the intubation time and in securing an airway flow after surgery at extubation time.

Material and methods

Study design

This study was a simple cross sectional prospective study. Preoperative informed consent was obtained from the Department of Human Anatomy, University of Uyo for the research work.

Study area

The study area was in Ibibio and Annang Ethnic groups of Akwa Ibom State. The Ibibios are the largest ethnic group of coastal people from Southern Nigeria. They are divided into six subcultural groups which are Eastern Ibibio, Western Ibibio, Northern Ibibio, Southern Ibibio, Delta Ibibio and Riverine Ibibio. Their local governments constitute the following, Etinan, Ibesikpo Asutan, Ini, Ibiono Ibom, Itu, Mkpato Enin, Nsit Atai, Nsit Ubium, Nsit Ibom, Uruan, Ikon, Uyo, Onna and Ikot Abasi (see **Fig. 1**)

The Annangs constitute the second largest ethnic group in Akwa Ibom. Out of the 31 local governments of the state, the Annangs constitute the following, Abak, Essien Udim, Etim Ekpo, Ika, Ikot Ekpene, Obot Akara, Oruk Anam and Ukanafun. The Ibibios accounted for 180 (60%) of the studied population while the Annangs accounted for 120 (40%) of the studied population. With regards to gender, 48% male and 52% female were used for the study.

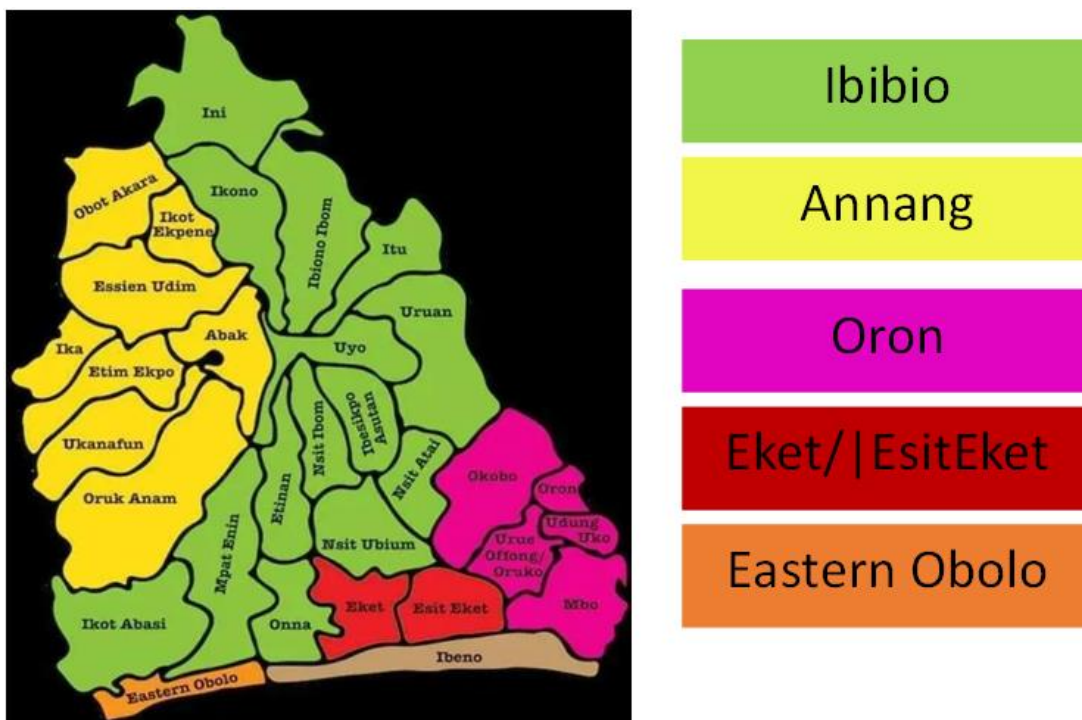


Fig. 1. Map of Akwa Ibom State

The two major Ibibio and Annang ethnic groups and other minor tribes of this State are represented by various colors in the rectangular boxes on the right. The Ibibios consisting of fourteen (14) Local Government Areas are represented by green. Similarly, the Annangs consisting of eight (8) Local Government Areas are represented by yellow color. Other minor ethnic groups in Akwa Ibom State include; the Oron, represented by purple color, the Eket/Esit Eket, represented by red color and the Obolo, represented by orange color.

Study population

A total of three hundred (300) consenting adults randomly drawn from the two ethnic groups in Akwa Ibom State (Ibibio and Annang) were used. Both male and female were duly considered for wide representation.

Inclusion criteria

All subjects aged 18 to 50 years, natives of either Ibibio or Annang ethnic groups of Akwa Ibom State and subjects who consented to participate in the study.

Exclusion criteria

Subjects with midline neck swelling, subjects below 18 years of age and older than 50 years of age, subjects unable to sit or stand, subjects with gross anatomical abnormality of the head and neck, subjects who refused to participate in the study, pregnant women and obese subjects.

Sample technique

Subjects who met the inclusion criteria were recruited using simple random sampling method.

Material

The following materials were used for the study; lateral neck radiographs of consenting adults, measuring tape (tape rule), standard rigid meter rule for accurate measurements of the distance, compass for taking measurements on the radiographs and markers for making points and distance to be measured, weighing balance for weight and meter rule for height.

Data analysis

Data was analyzed using SPSS application, ANOVA, and bar charts were used for the analysis.

Results

Three hundred (300) Subjects were enrolled in this study and the summary of their demographic data as shown in table 1 below shows that 40% (120) of the subjects were of Annang tribe while 60% (180) were of the Ibibio tribe. With regards to sex, 48% of the subjects were male and 52% female. The subjects participating in this study have their ages ranged from 18 years to 50 years, with mean age of 30.7 ± 0.49 . Their height and weight (kg) were within the age range of 137.0 cm – 195.0 cm and 34.9 kg – 94.8 kg respectively.

Table 1. Demographic data of Annang and Ibibio ethnic group

Variables	Range		Mean \pm S.E Mean	SD
Age(years)	18 -50		30.70 \pm 0.490	8.5
Height(cm)	137 -195		169.70 \pm 0.709	12.3
Weight(kg)	34.9 – 94.8		63.40 \pm 0.704	12.2
Gender	Male (48%) and Female (52%)		-	-
Ethnicity	Annang (40%) and Ibibio (60%)		-	-

Comparison of thyromental distance among adults of Ibibio and Annang ethnic group

This comparison is presented in the cross-tabulation table (table 2) below. The results shows that majority of the subjects 201 (67.0%) have thyromental distance between 6.0 cm and 6.5 cm, among this, 75 subjects were from Annang tribe while 126 were from Ibibio tribe. Twenty-eight (9.3%) of the subjects have thyromental distance less than or equal to 6.0 cm ($TMD \leq 6.0$), among this, 12 of them were from Annang tribe and 16 of them were from Ibibio tribe. Furthermore, it is also shown in table 2 based on the sample obtained that 10.0% of the Annangs have thyromental distance less than or equal to 6.0 cm, 62.5% have thyromental distance between 6.0 cm and 6.5 cm and 27.5% have their thyromental distance greater than 6.5 cm. Also, it is seen that 8.9% out of 300 Ibibios examined have thyromental distance less than or equals to 6.0 cm, 70.0% have their thyromental distance between 6.0 cm and 6.5 cm, and 21.1% have their thyromental distance greater than 6.5 cm.

In summary, it is seen that, higher percentage of subjects from the Annang tribe have thyromental distance less than or equals to 6.0 cm and thyromental distance greater than 6.5 cm compared to subjects from the Ibibio tribe, although a higher number of patients, from the Ibibio have thyromental distance between 6.0 cm and 6.5 cm compared to the patients from Annang tribe.

Table 2. Comparison of thyromental distance among adults of Ibibio and Annang ethnic group (Cross tabulation table)

			TMD RANGE			Total
			TMD≤6.0	6.0<TMD≤6.5	TMD>6.5	
Ethnic Group	Annang	Count	12	75	33	120
		% Within Ethnic Group	10.0%	62.5%	27.5%	100.0%
	Ibibio	Count	16	126	38	180
		% Within Ethnic Group	8.9%	70.0%	21.1%	100.0%
Total	Count	28	201	71	300	
	% Within Ethnic Group	9.3%	67.0%	23.7%	100.0%	

Table 3. Chi-square test of the relationship between TMD and ethnic group

	Value	df	P value (2-sided)
Pearson Chi-Square	1.941 ^a	2	.379
Likelihood Ratio	1.927	2	.381
Linear-by-Linear Association	.646	1	.422
N of Valid Cases	300	-	-
a= 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.20.			

To ascertain the significance of our comparison, Table 3 shows the result of the test of significant relationship between thyromental distance (TMD) and ethnic group. It is seen that, the Pearson chi-square, likelihood ratio and linear-by-linear association have their probability value greater 0.05 ($P > 0.05$), that is, $P = 0.379$ for Pearson (χ^2), $P = 0.381$ for likelihood ratio and $P = 0.422$ for linear-by-linear association, meaning that, though there is a relationship between ethnic groups and TMD but this relationship is not significant at all based on our sample result. Thyromental distance does not affect or is not affected by ethnic group.

Comparing the height and body weight among Ibibio and Annang ethnic group

Descriptive statistics were used to describe the height and body weight of the subjects from the Annang and Ibibio tribes and the results shown in table 4. Similarly, table 5 compares the mean height and mean body weight of the Annangs and Ibibios using t-test of independent sample.

Table 4. Summary statistics of height and body weight of subjects

	Ethnic Group	N	Mean	Std. Deviation	Std. Error of Mean
Height	Annang	120	170.3758	11.59626	1.05859
	Ibibio	180	169.2561	12.71902	.94802
Body Weight	Annang	120	63.7492	12.22408	1.11590
	Ibibio	180	63.1383	12.19735	.90914

The above table shows that subjects from Annang tribe possess an average height of 170.38 cm while those from the Ibibio tribe have an average height of 169.26 cm, meaning that on the average, subjects from the Annang tribe are taller than subjects from the Ibibio tribe. Moreover, we also see in the same table that subjects from the Annang tribe are heavier, with an average body weight of 63.75 kg than subjects from the Ibibio tribe which have an average body weight of 63.14 kg.

Table 5 shows that the probability values (p-values) for both the mean height and mean weight of the subjects from Annang tribe and Ibibio tribe are greater than 0.05 which means that there is no significant difference between the heights and body weights of subjects from the Annang tribe and those from the Ibibio tribe. It was observed that the p-value for the difference in the mean height of subjects between the Annang and those from the Ibibio are; $p = 0.44$ (greater than 0.05) assuming equal population variance of the subjects from the two tribes with mean difference of 1.1197 cm and $p = 0.43$ (greater than 0.05) assuming an unequal population variance of the subjects from the two tribes with mean difference of 1.1197.

Table 5. Independent sample t-test to compare the height and body weight among the Ibibios and the Annangs

		t-test for equality of means						
		T	Df	P-Value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Height	Equal variances assumed	.774	298	.440	1.11972	1.44756	-1.72902	3.96846
	Equal variances not assumed	.788	271	.431	1.11972	1.42104	-1.67797	3.91742
Body Weight	Equal variances assumed	.425	298	.671	.61083	1.43873	-2.22053	3.44219
	Equal variances not assumed	.424	255	.672	.61083	1.43936	-2.22373	3.44540

It was also observed that the p-value for the difference in the mean weight of subjects between the Annangs and the Ibibios are; $p = 0.671$ (greater than 0.05) assuming equal population variance of the subjects from the two tribes with mean difference of 0.6108 cm and $p = 0.672$ (greater than 0.05) assuming an unequal population variance of the subjects from the two tribes with mean difference of 0.6108 cm.

Comparing the thyromental distance, height and weight

This subsection presents the result of the comparison of thyromental distance, height and body weight. Table 6 displays the number of subjects, mean, standard deviation, both minimum height and weight, then maximum height and weight of subjects based on their TMD. It is shown that the mean height of subjects whose TMD is less than or equal to 6.0 is 166.5571 with standard deviation of 13.7469, minimum and maximum height of 137 and 193 respectively. Subjects whose TMD is greater than 6.5 cm are seen to be taller than others with mean height of 176.2817 cm; followed by subjects whose TMD lies between 6.0 cm and 6.5 cm with mean height of 167.8189.

Table 6. Descriptive statistics comparing thyromental distance, height and weight

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Height	TMD \leq 6.0	28	166.5571	13.74688	2.59792	137.00	193.00
	6.0<TMD \leq 6.5	201	167.8189	11.51808	.81242	137.00	195.00
	TMD>6.5	71	176.2817	11.55793	1.37167	140.00	195.00
Total		300	169.7040	12.27473	.70868	137.00	195.00
Body	TMD \leq 6.0	28	60.9464	14.79864	2.79668	34.90	90.00
	6.0<TMD \leq 6.5	201	61.2995	11.50955	.81182	34.90	94.20
weight	TMD>6.5	71	70.2408	10.45724	1.24105	50.50	94.80
Total		300	63.3827	12.19129	.70386	34.90	94.80

It is also shown that the mean weight of subjects whose TMD is less than or equals to 6.0 is 60.9464 kg with standard deviation of 14.79864, minimum and maximum weight of 34.90 kg and 90.00 kg respectively. Subjects whose thyromental distance is greater than 6.5cm are seen to be heavier than others with mean weight of 70.2408 kg; followed by subjects whose TMD lies between 6.0 cm and 6.5 cm with mean weight of 61.2995 kg.

Table 7. ANOVA table comparing means of height and weight of subjects

		Sum of Squares	Df	Mean Square	F	Sig.
Height	Between Groups (TMD)	4063.432	2	2031.716	14.722	.000
	Within Groups (TMD)	40986.623	297	138.002		
	Total	45050.055	299			
Body weight	Between Groups (TMD)	4377.899	2	2188.949	16.228	.000
	Within Groups (TMD)	40061.731	297	134.888		
Total		44439.630	299			

Analysis of variance (ANOVA) was used to compare the means of the height and weight of subjects based on their TMD and the result is shown in table 7 above. The result shows that, the p-value is less than 0.05 ($p = 0.000$) meaning that at least one group of the subjects' height based on their thyromental distance ($TMD \leq 6.0$; $6.0 < TMD \leq 6.5$; $TMD > 6.5$) differs significantly. The same conclusion also applies to the subjects' weight since its p-value is also less than 0.05 ($p = 0.000$).

Analysing the thyromental distance, height and body weight in relation to sex and ages

The chart in Fig. 2 shows the pictorial representation of the analysis of height and body weight of subjects in relation to sex and ages. It can be seen that the height of female subjects within the age group of 18–20 years is 169.892 cm on the average while their weight within the same age group is 60.6873 kg, additionally, the height of male subjects within the age group of 18 – 20 years is 166.941cm on the average while their weight within the same age group is 61.3258 kg.

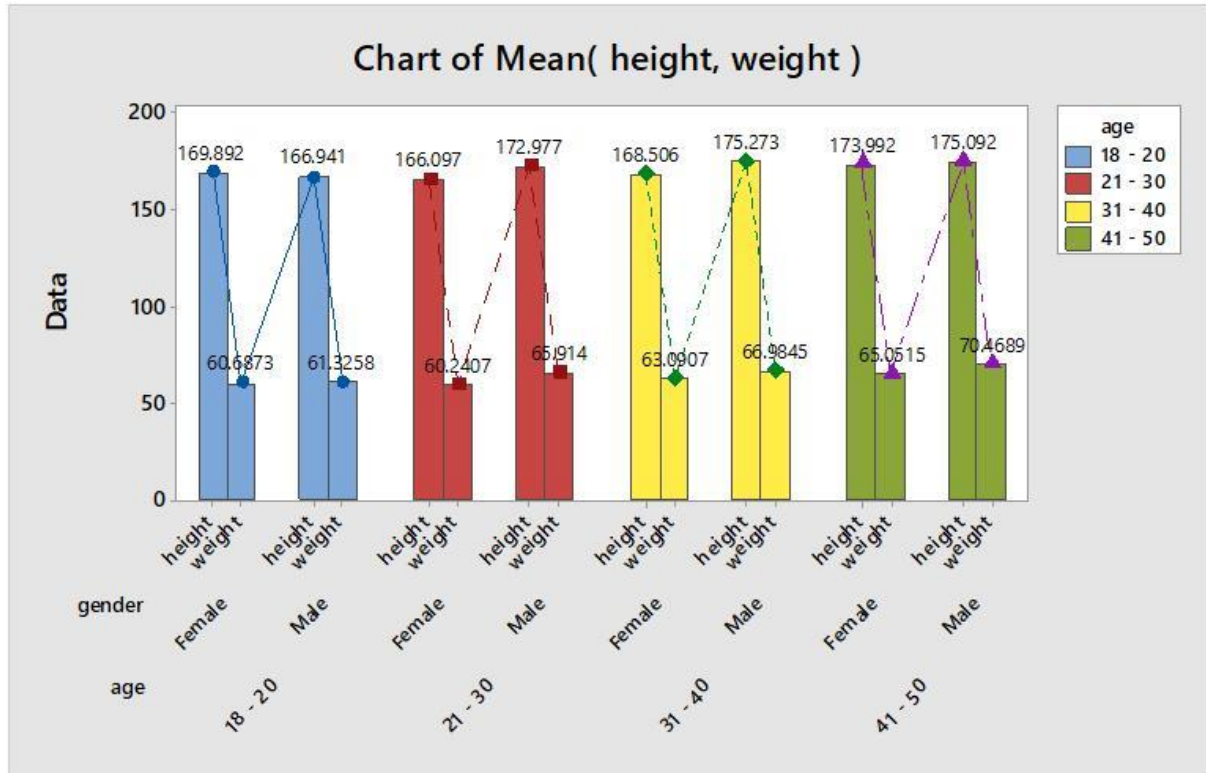


Fig. 2. Bar chart showing the analysis of height and body weight in relation to sex and ages.

Discussion

In this study, we have explored the thyromental distance variation in relation with the height, body weight and sex among adults of two major tribes (Ibibio and Annang) of Akwa Ibom state, Nigeria. We can discuss analyzed results according to their medical or anthropological usefulness as follows:

Medically speaking, in the practice of airway management, thyromental distance is customarily regarded as a rough estimate of the submandibular space (SMS) that has to accommodate the tongue during laryngoscopy (Janssens and Hartstein 2001). It can be represented by a straight line drawn between the mentum and thyroid cartilage and is measured at full head extension. This implies that the magnitude of the thyromental distance is dependent on three factors namely, mandibular growth, laryngeal descent in the neck and the extent of full head extension (King and Adams 1992). Assessment of the airway and prediction of difficulty in laryngoscopy is done by most anesthesiologist during the preoperative check-up. Anesthetists at times encounter difficult intubation in an apparent normal individual in spite of using the best positioning and profound relaxation (Arne *et al.* 1998).

When a difficult airway is unrecognized before attempt at endotracheal intubation, the result can be catastrophic because the personnel and equipment necessary for utilizing the specialized tracheal intubation technique may not be immediately available and the patient's spontaneous respiratory effort may have been eliminated by anesthetics or muscle relaxant. Thus, identifying patients who are likely to harbor an airway cannot reliably be secured by simple direct laryngoscopy which is an important skill for all anesthesiologist (Gazouri *et al.* 1996). Most studies have considered difficult laryngoscopy as indicative of difficult intubation (Gupta *et al.* 2010). Although, difficult laryngoscopy is an important component of difficult intubation, the two conditions may not always be necessarily correlated (Prakash *et al.* 2013). Thyromental distance is a frequently used airway assessment test. However, its role as a predictive test for identifying patients with a difficult airway is limited.

Anthropologically, thyromental distance offers room to predict difficult laryngoscopy among world populations and ethnic groups. Numerous studies have been done to predict difficult intubation. In one meta-analysis (Shiga *et al.* 2005), of 35 studies, it was found that each preoperative airway assessment test, thyromental distance measurement yielded poor to moderate sensitivity (20-62%) and moderate to fair

specificity (82-97%) against the theory which stated that the sensitivity of thyromental distance alone varies from 15% to 95% and the specificity of TMD also varies from 24% to 98% (Aktas *et al.* 2015). Interestingly, in 80% of these studies, diagnostic criteria for difficult intubation used were Cormack and Lehane grade III or IV (Juvin *et al.* 2003). Other studies too indicated that poor laryngeal view is not synonymous with difficult intubation. The idea was to find out the incidence of difficult intubation and to compare the three available methods of predicting difficult intubation using the intubation difficulty scale (IDS) (Adnet *et al.* 1977).

According to Jeon and Colleagues, the universal bench mark for TMD is 6.5 cm. TMD greater than 6.5 cm ($TMD > 6.5$ cm) indicates normal, easy intubation. Thyromental distance ranging from 6.0 cm to 6.5 cm indicates slightly difficult laryngoscopy, but difficult intubation may be possible and thyromental distance less than 6.0 cm ($TMD < 6.0$ cm) indicate difficult laryngoscopy and intubation impossible (Jeon *et al.* 2011). In our study, Annang males had a higher thyromental distance than Ibibio males and Ibibio females had a higher TMD than Annang females. Our results shows that 201(67.0%) of subjects which is the majority of the subjects have TMD between 6.0 cm and 6.5 cm, among this, 75 subjects were from the Annang tribe while 126 were from the Ibibio tribe. 28 (9.3%) have thyromental distance less than or equals to 6.0 cm ($TMD \leq 6.0$) where 12 of them were from the Annang tribe and 16 were from the Ibibio tribe. Furthermore, our study also showed that 10.0% of the Annangs have thyromental distance less than or equal to 6.0 cm, 62.5% have thyromental distance between 6.0 cm and 6.5 cm and 27.5% have their thyromental distance greater than 6.5 cm. Also, it can be seen that 8.9% out of 300 Ibibios examined have thyromental distance less than or equals to 6.0 cm, 70.0% have thyromental distance between 6.0 cm and 6.5 cm, and 21.1% have their thyromental distance greater than 6.5 cm. Our findings are in tandem with a study by Ekanem *et al.* 2023, who reported a higher thyromental distance in Annang subjects when compared to their Ibibio counterparts. Pradesh *et al.* 2013 also reported that possible differences due to ethnicity may affect the incidence of difficult airway. Moreso, Balakrishnan and Chockalingam 2017, reported cut off value of 17.1 for RHTMD (ratio of height to thyromental distance) to predict difficult laryngoscopy which varied among Indian population.

The study showed that, Ibibio males had a lower thyromental distance than Annang males. This may be due to the advancement of age which would lead to the reduction in the size of the thyroid cartilage (thyroid cartilage ossification) while Annang

females had lower thyromental distance. This could be due to short mandibular space which would compress the structures located around the mandible. However, 20 (3.3%) have a thyromental distance less than 6.0 cm (TMD < 6.0 cm). This is an indication for poor laryngoscopy and difficult tracheal and laryngeal intubation. Our study also shows that subjects from Annang tribe possess an average height of 170.38 cm while those from the Ibibio tribe possess an average height of 169.26 cm, meaning that, subjects from the Annang tribe are taller than subjects from the Ibibio tribe. Moreover, we observed that subjects from the Annang tribe are heavier with an average body weight of 63.75 kg when compared to subjects from the Ibibio tribe with an average body weight of 63.14 kg.

Conclusion

From our results, it can be concluded that, difficult laryngoscopy could be experienced among the Ibibio males than the Annang males as a result of possession of smaller thyromental distance among the Ibibio citizens. Similarly, same scenario (difficult intubation) applies to Annang females observed to have lower thyromental distance than their Annang counterparts.

Conflicts of Interest: The authors have declared that, no conflicts of interest exist.

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