

Anthropometric Study of Weight, Height and Blood Pressure in Children from NNEWI North Local Government of Anambra State, South East Nigeria

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Abstract- The reports of longitudinal study of blood pressure in childhood suggest an important role for early detection and enhancing a better understanding of the natural history of elevated blood pressure. This is important in Africa where reports of childhood blood pressure studies are scarce. In this study, anthropometric parameters (weight and height) were measure to check their correlation with blood pressure. The study was carried out on 320 primary school children whose age ranged from 6-14 at a gender ratio of 1:1. Their heights, weights and blood pressures were measured using height meter, weighing scale, sphygmomanometer and stethoscope. The results showed that weight and height values correlated with systolic and diastolic blood pressure for males in all age groups except in age groups 6-8years. In females, weight values correlated with systolic and diastolic blood pressure in all age groups while height correlated with blood pressure only in age groups 6-8years and 9-11 years. Females also showed higher mean weight values than the males in all age groups except in groups 6-8years. The present study indicated that weight and height were associated with blood pressure; with weight showing stronger association with systolic and diastolic blood pressure than height. Females had higher mean systolic and diastolic blood pressure than males starting from ages 9-14.

Index Terms- Blood Pressure, Weight, Height, Anthropometry, Nigeria children.

I. INTRODUCTION

Anthropometry is the longest used measure of human variation. It encompasses a variety of human body measurements of which weight and stature are involved. However, studies have been carried out in the past to identify how anthropometric indices can be used as markers of child blood pressure in Africa and other continents [1,2].

Regardless of patient age, measurement of the blood pressure should be part of routine physical examination. Its values as a screening tool for hypertension in adults has long been documented. It is firmly established as an important component of the routine pediatric physical examination [3].

The necessity for routine blood pressure screening in children was debated in the past, the main argument against it being that essential hypertension is an adult disease but however, though consider rare in children, blood pressure is being diagnosed increasingly often and is known to exist in African children [4].

Studies have shown that blood pressure in children is closely related to height and weight. Blood pressure in children however tends to tract from childhood to adulthood [5] and prevention and control of elevated blood pressure in children might be an important strategy for limiting the disease burden due to hypertension [6].

The development of such strategy, however requires more evidence on the link between blood pressure and its associated factors in children of different populations particularly in a context of a ranging epidemic of pediatric obesity [7,8].

This scenario provide a severe necessity to carry out this research. Hence this study aims to explore association between body age measurements (weight and height) and blood pressure in healthy primary school children between the ages of 6-14 years.

II. MATERIALS AND METHODS

Study Area and Population: This study was conducted in Nnamdi Azikiwe University demonstration Nursery and Primary School, Nnewi and Christ Foundation Nursery and Primary School Nnewi, in Nnewi North Local Government of Anambra State, Nigeria. Both School have 1400 pupils with males and females contributing 41% and 59% respectively.

Instrument for Data Collection: The materials used for the study include: height meter, weighing scale, sphygmomanometer and stethoscope.

Parameters in Data collection: Prior to the data collection, the subjects gave their consent after an assurance of confidentiality was given. The following parameters were determined and recorded: age, sex, height, weight, systolic blood pressure and diastolic blood pressure.

Method of Data Collection: In the present study, weight, height and blood pressure of 320 primary school children were measured using standard anthropometric instruments (height meter, weighing scale and sphygmomanometer).

Weight: The students were weighed using a bathroom scale which was regularly checked against a standard scale. Each student was asked to remove everything they have in their hands and pockets. This was done so that no additional weight would be added to their normal weight.

Height: The heights of the pupils were measured with the children standing erect, heels together, chin up, and a horizontal rule was made to rest on the head and the heights were read off from an erect metre rule placed on a flat surface and against the wall.

Blood Pressure: Blood pressure was measured on the left arm by auscultatory method using mercury sphygmomanometer. The individual was made comfortable and seated at least for five minutes in their chair before measurement. Two readings were taken ten minutes apart and the average of two was taken.

Data Analysis: The data obtained was analyzed using SPSS 16.0. Descriptive statistics of mean and standard deviation were used to examine the data. Pearson moment correlation was

used to find correlation between anthropometric measurements and blood pressure and compared by using T-test.

III. RESULTS

Table: Gender differences in the anthropometric parameters and blood pressure of subject in different age groups.

	Age group 1 (6-8years)			Age group 2(9-11years)			Age group 3 (12-14 years)		
Parameter /sex	Mean + Std	T. Start	Prob. Of Sig	Mean + Std	T Start	Prob of Sig	Mean + Std	T. Start	Prob of Sig
Age:									
Male	7.23±0.81	0.11	P<0.05	9.9 ± 0.81	-1.10	P>0.05	12.69±0.84	0.82	P>0.05
Female	7.21±0.86			10.12±0.83			12.81±0.78		
Weight:									
Male	25.42±3.57	0.10	P<0.05	32.52±6.22	1.65	P>0.05	41.24±7.95	3.36	P>0.05
Female	25.33±3.65			34.42±7.31			46.69±7.74		
Height:									
Male	1.25±0.08	1.08	P>0.05	1.37±0.82	1.73	P>0.05	1.47±0.09	1.80	P>0.05
Female	1.27±0.53			1.40±0.11			1.50±0.09		
SBP:									
Male	83.21±10.30	0.63	P<0.05	83.80±12.84	2.83	P>0.05	94.25±11.78	0.90	P>0.05
Female	81.61±11.55			90.23±13.84			96.48±13.36		
DBP:									
Male	63.47±59.11	0.88	P<0.05	63.51±9.55	2.87	P>0.05	72.75±10.11	1.46	P>0.05
Female	61.55±9.73			68.47±10.73			75.67±10.41		

Independent sample t-test showed that the males in all age groups had insignificant lower height (P>0.05) when compared to the females. The males in age group 1 also had insignificant (P>0.05) higher age, weight, systolic blood pressure and diastolic blood pressure when compared with the females in the same group. Females showed insignificant higher (P>0.05) age and height in a groups 2 and 3 when compared with the males in the same group. Females in age group 2 showed significant higher (P<0.05) in systolic blood pressure and diastolic blood pressure than the males in the same group. Females in age group 3 also showed significant higher (P<0.05) weight than the males in the same group.

Table 2: Age wise distribution of weight, height, systolic blood pressure and diastolic blood pressure P in both males and females showing man, standard deviation and P-values.

Parameter	Mean + Std (6-8 yrs)	T. Start (9-11 yrs)	Prob. Of Sig	Mean + Std (12-14 yrs)	Prob of Sig
Weight	25.38±3.59	33.53±6.86	P<0.05	44.04±8.27	P<0.05
Height	1.26±0.07	1.39±0.10	P<0.05	1.49±0.09	P<0.05
SBP	82.51±10.81	87.22±13.71	P<0.05	95.40±12.61	P<0.05
DBP	62.63±9.37	66.15±10.46	P<0.05	74.25±10.32	P<0.05

All parameters increases significantly (P<0.05) with age.

Table 3: Correlation of Anthropometric data with systolic and diastolic blood pressure in males (n=160)

Parameter		6- 8years		9-11years		12-14years	
		SBP	DBP	SBP	DBP	SBP	DBP
Weight	Pearson Correlations	0.095	0.023	0.603	0.29	0.546	0.469
	Sig (2-tailed)	0.543	0.883	0.000	0.018	0.000	0.001
Height	Pearson correlation sig (2 tailed)	0.045	-0.060	0.417	0.404	0.427	0.424
		0.774	0.702	0.001	0.00	0.002	0.002

Pearson’s correlation test showed significant association between weight and blood pressure in age group 2 and 3 but insignificant correlations in the age group 1 in males. Height showed insignificant association with blood pressure in males in age group 1 but showed significant association with blood pressure in males in ages 2 and 3.

Table 4: Correlation of Anthropometric data with systolic and diastolic blood pressure in females (n=160).

Parameter		SBP	DBP	SBP	DBP	SBP	DBP
		Weight	Pearson Correlations	0.453	0.442	0.560	0.385
	Sig (2-tailed)	0.008	0.010	0.000	0.001	0.000	0.071
Height	Pearson correlation sig (2 tailed)	0.200	0.267	0.330	0.159	0.037	0.066
		0.265	0.133	0.004	0.177	0.788	0.633

Pearson’s correlation test showed significant association between weight and blood pressure in all the age groups except for DBP in age group 3 in females. Also, there was insignificant association between height and blood pressure in all the age groups except for SBP in age groups 2 which showed significant correlation.

IV. DISCUSSION

This study investigated the relationship of some anthropometric parameters (weight and height) with blood pressure in primary school children of Okofia, Otolo Nnewi in Anambra State, Nigeria.

The findings of this study indicated an increasing blood pressure with height and weight in all the age groups of both males and females. The increasing blood pressure with height and weight in all age groups is not unusual. It has been reported in previous studies and known to occur steadily throughout the first two decades of life [9,10].

The increase in mean systolic blood pressure and diastolic blood pressure was higher in males of age groups 6-8 while age groups 9-11 and 12-14 years were found to have a higher mean blood pressure than the males. This could be as a result of the onset of puberty or due to the females are heavier than the males at this age.

This result agrees with previous work done by Ayoola in a study of adolescent hypertension in Western Nigeria [11]. Similarly, other studies on blood pressure of school children in Western Nigeria found that females who are heavier than the males had higher blood pressure [12,13].

There was higher significant correlation between weight and blood pressure in all the age groups except for diastolic blood pressure in age groups 12-14 in females. Also, there was significant association between height and blood pressure in all the age groups except in systolic blood pressure in age groups 9-11 which showed a significant correlation in females.

Males showed significant association between weight and blood pressure in age groups 9-11 and 12-14 but showed insignificant correlations in the age groups 6-8. Furthermore, the height showed insignificant association with blood pressure in age groups 6-8 but showed significant associations with blood pressure in age groups 9-11 and 12-14 years.

Therefore, from the present study, weight and height were associated with blood pressure with weight showing stronger association with systolic and diastolic blood pressure than height.

V. CONCLUSION

The present study showed that females had higher mean systolic and diastolic blood pressure than the males starting from ages 9-14 years.

REFERENCES

- [1] Balogun JA, Obajulura VA, Abereje OK et al Anthropometric determinants of resting blood pressure and heart rate of Nigerian School children *Amals of Tropical Pediatrics* 1990, Vo. 10 (4): 425-431.
- [2] Savva Sc, Tornaritis M, Savva M ME et al Waist circumference and waist-to height ratio are better predictors of cardiovascular disease risk factors in children than body mass index *international Journal of Obesity* 2000, vol. 24 (11): 1453-1458.
- [3] Sinaiko AR Hypertension in Nigerian children *N Engl J. Med* 1996, 335 (26)1968-1973.
- [4] Labarthe DR Prevention of cardiovascular risk factors in the first place. *Prev Med* 1999, 29:572-578.
- [5] Fuentes RM, Notkola IL, Shemeikka S, Tuomilehto J, Nissinen A Tracking of systolic blood pressure during childhood: A 15 years follow-up population based family study in Eastern Finland *J. Hypertensions* 2002, 20: 195-202.
- [6] Cole JJ, Bellizzi, MC, Flegal KM, Dietz WH Establishing a standard definition for child overweight and obesity world wide. *International survey BMJ* 2000, 320:1240-1243.
- [7] Whitlock EP, Williams SB, Gold R, Smith PR, Shipman SA Screening and interventions for childhood overweight: a summary of evidence for the US Preventive Services Task Force. *Pediatrics* 2005, 116:125-144.
- [8] Hamidis LJ, Okoro EO, Ali MA Blood pressure profile in Nigeria children *East Afri. Med. J.* 2000, 77 (4): 180-184.
- [9] Gutin B, Basch C, Shea S et al Blood pressure, fitness and fatness in 5 and 6 years old children. *JAMA* 1990, 264:1123-1127.
- [10] Ayoola A.E Prevalence of adolescent hypertension in Nigeria *Nig.J. Pediatric* 1979, 6:18-26.
- [11] Ekunwe E.O, Odunjin OM Proteinuria and blood pressure profile of Lagos School children. *Nig. J. Pediatric* 1991, 18:3-11.
- [12] Antra-Obony LE Arterial blood pressure of Nigeria urban and rural school children. *Nig. J. Pediatric* 1991, 18:3-11.

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