Association of Blood Pressure and Blood Glucose with Body Composition amongst Ellisras Rural Black Young Adults Aged 21-30 Years Old: Ellisras Longitudinal Study.

P1-E13

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Both systolic blood pressure (SBP) and diastolic blood pressure (DBP) showed a significant strong positive correlation with lean body mass (LBM) in both males and females. However fasting blood glucose (FBG)did not show any significant association with lean body mass before and after adjusting for age and gender.

BACKGROUND

Cardiovascular disease (CVD) remains the leading global cause of preventable death accounting for approximately 30% of deaths worldwide, for which hypertension and type 2 diabetes are certainly associated with a large component of this morbidity and mortality The prevalence of hypertension and type 2 diabetes mellitus is still expected to rise in the coming decades partly due to the effects of excessive accumulation of body fat and changes in lifestyle However, the precise mechanisms for increased cardiovascular risk in excessive body fat composition are not clear Results of previous studies on the association of blood pressure and blood glucose with body composition yielded conflicting results, but generally suggest that there is an association. The inconsistencies are likely related to differences in study subjects with regards to age, ethnicity/race, pubertal stage, geographic location, dietary habits, physical activity, and methodology for measuring blood glucose. While there has been considerable research on association of blood pressure and blood glucose with body composition reported elsewhere, there is limited information in the English literature amongst young adults on such association from the rural communities of Limpopo Province. Therefore, the present study aims to investigate the association of blood pressure and blood glucose with body composition amongst Ellisras rural black young adults aged between 21-30 years old.

METHODS

Geographical area and sampling

The research study was conducted in the villages within Lephalale region (formerly known as Ellisras), a rural setting in the Limpopo province of South Africa. The study area is situated in the Waterberg district within the north-western area of the Limpopo Province. The Lephalale region covers approximately 42 rural settlements. The total population of Lephalale is estimated at 50, 000.

The study is a cross-sectional sub-study of the longitudinal study titled “Ellisras Longitudinal Study.” Ethical clearance was granted by the Ethics Committee of University of Limpopo, All Participants signed the informed consent form. The study comprised of 624 participants, 306 of whom were females and 318 were males aged 21-30 years. Participants diagnosed with hypertension and diabetes mellitus were excluded from the study.

Data collection

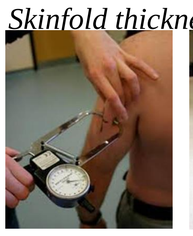
Anthropometric measurements

All anthropometric measurements were measured according to the International Society for the Advancement of Kinathropometry.

Weight measurements

The calibrated measuring scale was used to measure weight to the nearest 0.1kg. The participants were barefooted with minimal clothing, standing with their chin in a perpendicular position while the reading is taken.

Skinfold thickness measurements



Measurement of skinfold thickness was done using an instrument called the caliper, the following skinfolds were measured: triceps and subscapular. The readings were measured three times to the nearest 0.1mm.

Blood pressure **measurement**

The electronic micronta monitoring kit was used to measure blood pressure. Diastolic blood pressure and the Systolic blood pressure readings were taken from the right arm twice to ensure that accurate and reliable results were obtained. Both the were taken while the participant was in a seated and relaxed position with the time interval being 5 minutes in between the measurements

Blood glucose measurement

The participants were requested to fast for a period of 8–10 h before blood collection. The glucose oxide method was used to measure fasting blood glucose (FBG) levels with different reagents such as oxalate and sodium fluoride.

Body composition equations

Males %BF= 1.21(triceps+subscapular)-0.008x (triceps+subscapular) squared+1.17
Female %BF= 1.33x (triceps+subscapular)-0.013x (triceps+subscapular0squared-2.5
For participants with sum of triceps and subscapular<35mm, the following equation was used:
Males %BF= 0.783 (tricept+subscapular) +1.6
Females %BF= 0.546(triceps+subscapular) +9.7
Body fat was calculated using body fat percentage and total body weight:
Body fat = body weight x (%BF/100)
Lean body mass = body weight – body fat.

Statistical analysis

Descriptive statistics -the comparison of SBP, DBP and FBG with components of body composition between genders. The Pearson correlation -correlation between genders using SBP, DBP and FBG with LBM, BF% and BF.
Linear regression- association between SBP, DBP and FBG with BF%, BF and LBM for both unadjusted and adjusted for age and gender. All statistical analysis was done using Statistical Package for the Social Sciences (SPSS
The p-value<0.05

RESULTS

Table 1.1 illustrates the mean values and standard deviation of FBG, SBP, DBP, LBM, BF% and BF for both males and females. Males have significantly higher mean value of SBP than females and a high (128.180 vs 117.352 mmHg). The mean value of DBP is slightly higher in males compared to females (72.585 vs 70.484 mmHg). The mean value of FBG in females is higher than that of males (males (29.094 vs 13.945%) and (21.326 vs 9.542%), respectively. Males have significantly higher mean value of LBM than females (55.657 vs 47.421).5.617 vs 5.448 mml/L) with no statistical significance. Females have a significantly higher mean value of BF% and BF than

Table 1.1 Descriptive statistics for components of body composition, blood glucose and blood pressure measurements.

FBG	SBP	DBP	LBM	BF%	BF
Males M(SD)					
5.45(0.87)	128.18(13.62) **	72.59(11.93)	55.66(8.41) **	13.95(7.63) **	9.54(7.67) **
Females M(SD)					
5.62(1.55)	117.35(11.98) **	70.48(10.74)	47.42(15.10) **	29.09(18.49) **	21.33(18.03) **

Table 1.2 shows Pearson’s correlation for the association of blood pressure and blood glucose with body composition. There is a significant positive correlation between SBP and BF in females (r^2=0.128). There are significant strong positive correlations between SBP and LBM in both males (r^2=0.257) and females (r^2=0.216). There is also positive correlation between LBM and DBP in both males and females (r^2=0.148 and r^2=0.188, respectively). There are non-significant negative correlations between BF% and blood glucose in both males and females (r^2= -0.007 and r^2= -0.022).

Table 1.2 Pearson correlation for the association of blood pressure and blood glucose with body composition

Variables	SBP		DBP		Glucose	
	Males	Females	Males	Females	Males	Females
BF%	0.042	0.058	0.003	-0.001	-0.007	-0.022
BF	0.101	0.128*	0.054	0.046	0.015	0.005
LBM	0.257**	0.216**	0.148**	0.188**	0.075	0.071

Table 1.3 shows the association between BP and FBG with various components of body composition for both unadjusted and adjusted for age and gender. There are significant associations of SBP and BF% as well as SBP and LBM for unadjusted (Beta= -0.144, CI= -0.192; -0.157, p-value<0.05) and (Beta= -0.060, CI= -0.128; 0.017, p-value<0.05). There is also a significant association between SBP and LBM for adjusted (Beta=0.315, CI=0.258; 0.418, p-value<0.05).

Table 1.3 Linear regression of blood pressure, blood glucose and body composition measurements.

Variables	Unadjusted				Adjusted			
	Beta	P-value	95%CI		Beta	P-value	95%CI	
SBP								
			Lower bound	Upper bound			Lower bound	Upper bound
BF%	-0.144	0.000**	-0.192	-0.157	0.144	0.295	-0.033	0.109
BF	-0.060	0.133	-0.128	0.017	0.101	0.012*	-0.012	0.165
LBM	0.315	0.000**	0.258	0.418	0.223	0.000**	0.143	0.304
DBP								
BF%	0.043	0.288	-0.086	0.025	0.007	0.882	-0.068	0.058
BF	0.005	0.098	-0.056	0.063	0.039	0.377	0.035	0.093
LBM	0.184	.000**	0.094	0.230	0.166	0.000**	0.074	0.218
FBG								
BF%	0.014	0.728	-0.005	0.007	-0.021	0.641	-0.009	0.005
BF	0.032	0.426	-0.004	0.009	0.008	0.848	-0.006	0.008
LBM	0.047	0.244	-0.003	0.012	0.077	0.069	-0.001	0.016

CONCLUSIONS

General characteristics of the participants

Males have slightly higher mean values of SBP and statistically higher DBP than females. The observation that the SBP and DBP were found to be in the ranges considered to be normal is not surprising, but it can be explained by the exclusion criteria set in this study. These findings are in agreement with Al-Sendi et al 2003 and Reckelhoff 2018, who demonstrated higher blood pressure values in males than in females. Possibly, higher values of blood pressure in males could be that males and females have varied mechanisms for the regulation of blood pressure.

Female participants had generally higher mean FBG value than male subjects; however, the difference was not statistically significant to suggest meaningful generalized implications. However, this was inconsistent with Danaei et al 2011 who reported slightly higher mean value of FBG in males than in females.

The black culture (both black men and women) seems to embrace the ideology that big is beautiful, finding it more attractive and more feminine. The high BF and BF% values found among females in the present study corroborate earlier literature by Soniya et al 2014

Association of blood pressure with body composition

Replicating consistent results from the previous studies, the present study produced evidence that blood pressure may have varied relation to body composition in males and females. To put this information into context, there was a significant positive correlation between LBM and DBP in both males and females. There was also a significant positive correlation between BF and SBP in female subjects.

Association of blood glucose with body composition

Through the analysis conducted in the present study, there was no significant association between FBG and all components of body composition. However, this is inconsistent with previous study[14] which reported that FBG is highly correlated with BF and BF%. This lack of significant association may suggest that the association between blood glucose and body composition may be confounded by other cardiovascular risk factors such as alcohol, smoking and physical inactivity

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